November 1961

Electrical South

a W.R.C. Smith publication

El Pa ...ment store includes accent lighting in its multi-million dollar remodeling program

In this issue:

Well-equipped residence has 600-ampere electrical service

Voltage control system uses time clock scheduling

Utility engineering section begins on page 39

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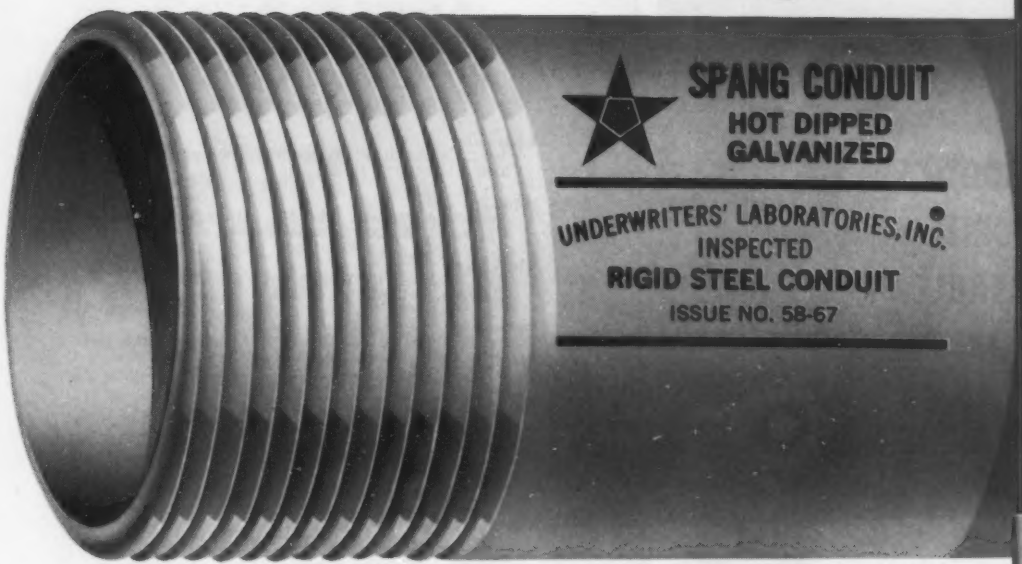

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Published monthly by

W. R. C. SMITH PUBLISHING COMPANY

Executive and Editorial Offices

1760 Peachtree Road, NW

Atlanta 9, Georgia

Telephone: 874-4462 (Area Code 404)

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ELECTRICAL SOUTH is published 13 times per year at 116 E. Crawford St., Dalton, Ga., by W. R. C. Smith Publishing Co. Executive and Editorial Offices: 1760 Peachtree Rd., NW, Atlanta 9, Ga. Second-Class postage paid at Dalton, Ga. Postmaster, send notices by Form 3579 to 1760 Peachtree Rd., NW, Atlanta 9, Ga.

Electrical South

Vol. 41, No. 11 November 1961

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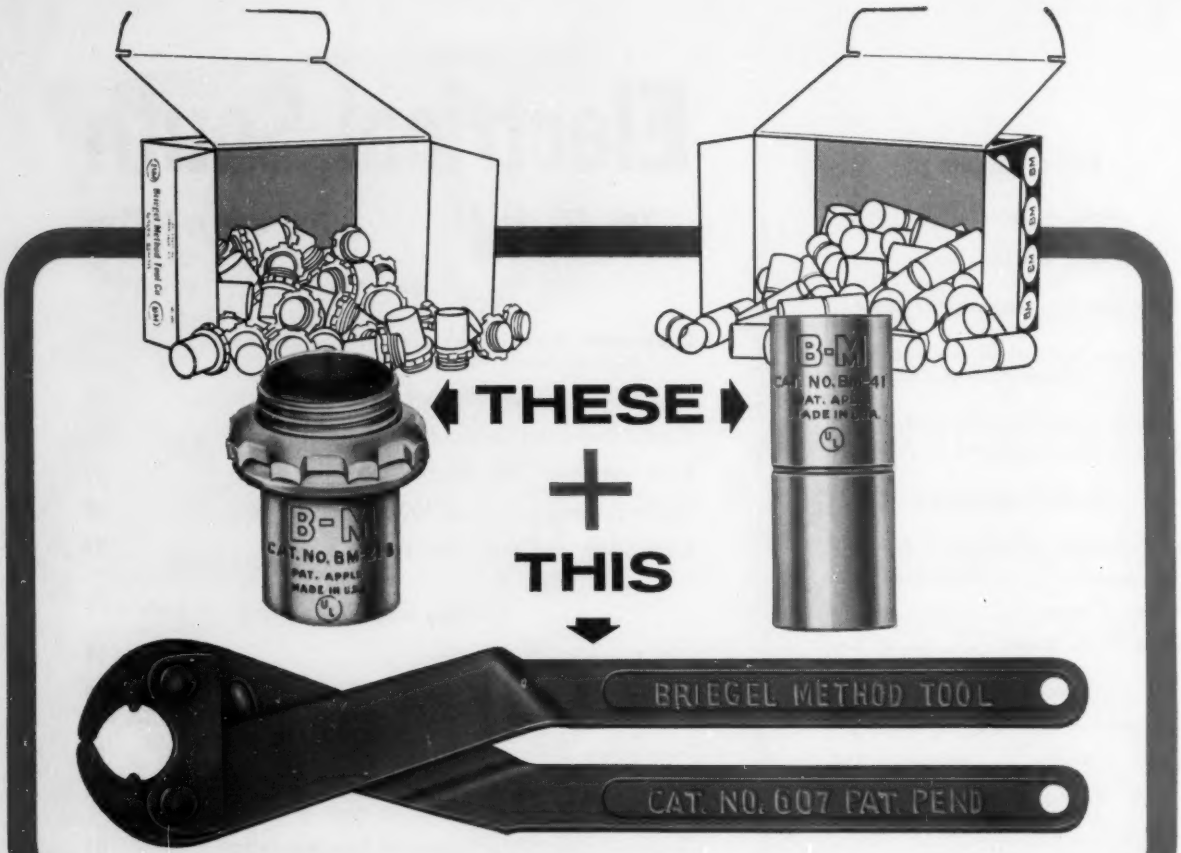
FRONT COVER—Lighting was made an integral part of the remodeling program of The Popular Dry Goods Co. An article beginning on page 20 shows how a carefully planned installation subtly brings shoppers' attention to the merchandise placed on display.



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Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Confused business pattern

Business is just not living up to the exalted forecasts that were made during the early part of the year.

The picture of business progress is one of muddled design, and it is extremely difficult to pick out enough favorable factors to warrant any strong degree of optimism. Even in Washington, the federal statistical agencies seem to wear an expression of pained surprise when they see the results of their findings.

For example, unemployment still hovers around seven per cent of the labor force in spite of fairly heavy increases in the number of persons employed. This figure was predicted to decline drastically as the year 1961 moved into the final quarter.

It is very difficult to promote a sound labor picture with this statistic in mind and the equally somber developments in the strikes at General Motors and later at Ford. Such activity will inevitably delay economic progress for the nation and certainly has stalled the move toward more prosperous conditions.

Influence of auto industry

This column has pointed out frequently that without broad-based strength in the automobile market there can be only slim prospects of health in the economy as a whole. It is a fact that no other American industry has such a widespread effect upon the prosperity of so many other businesses and industrial organizations.

In fact, the auto industry itself is a mammoth organization with thousands of persons, in small towns and large, dependent upon it for their living. It would be hard to visualize any community within this nation that is not affected adversely in the economic sense when the automobile industry is in trouble.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

Then there are the impacts that a poor automobile year has on other industries from which the raw and semi-finished materials come, such as iron and steel, glass, rubber, textiles, electrical equipment, and a host of other suppliers. Unfortunately, one of these, the steel industry, had been hoping for a better automotive year so that a return to near-capacity production might be anticipated.

The strikes in this field plus the normal business declines during the model changeover period have seriously jeopardized any hopes in this direction. In fact, the automobile companies will do well to maintain their production status quo for the balance of the year. Perhaps the old baseball saying can be legitimately applied here, "Wait till next year."

Cold war implications

The impact of the cold war also has an impact upon the domestic economic scene. Certainly the continued high level of defense spending, with more to come, gives an element of strength to the industrial picture. Each of the military services is busy granting contracts to small and large firms for the production of needed materials to keep their forces on the standby alert.

Two adverse effects are being felt at the present time, however. In the first place, the Berlin crisis and the activation of certain reserve units have occasioned some distress among consumers who visualize dangers to income from the prospect of military service.

This affects not only those who are called up and who have approximately 30 days to adjust business and personal affairs, but also those many others who have not been notified but who are members of the organized and standby reserves. It is not surprising that these people take second looks at planned consumer expenditures in order to maintain their savings position at a high level for emergency purposes.

This restriction upon buying can mushroom until its effect becomes a stumbling block over which a normal economic prosperity could hardly move. The consequence, of course, is a slowdown in the sales of many consumer products.

The second adverse effect of the cold war is the position of industrial expansion in the light of potential military action. For the past two years, industrial expenditures for plant improvements and expansion have not lived up to forecasts as a result of the recent recession, the election campaign, and a miscellany of strikes and minor economic upheavals.

Many economists have predicted a strong upsurge in such expenditures in the fourth quarter of 1961 and on into 1962. The impact of economic uncertainty occasioned by the day-to-day fluctuations from cold to hot hostilities has caused many industries to give hard consideration to a delay of many projected expansions.

So far there has not been too great a reduction in such costs, but a continued uncertainty is bound to cause a further review of expansion needs and almost certain restrictions. This, of course, can develop into a very important economic factor.

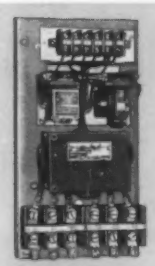
Security markets

It is not surprising that the aforementioned factors should have an impact upon activity in the sale of securities. The significant fact is that the market has remained unusually strong in the face of the bad news that has infected the business scene. Trading volume has remained substantial and profit-taking has not been a significant factor.

As of this writing, much of the earlier paper losses that had been noted by the investment advisory agencies had been regained and the pattern of activity indicated that prices might have reached a plateau. Early reports of third-quarter earnings have been most stimulating to investors, and it would appear that many have a belief in the basic soundness of the stronger industrial securities.

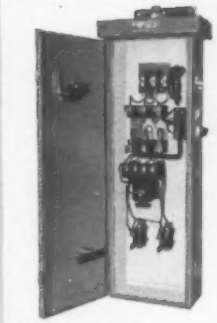
(Continued on page 104)

Your A-B Handy Catalog Lists These Control Devices Often Considered "Special"



BULLETIN 812
Phase Failure—Phase Reversal Relays

Style F relay (above) protects against all open phase conditions on a branch motor circuit. Style R disconnects the motor upon a phase reversal. Style RF gives phase failure and phase reversal protection.

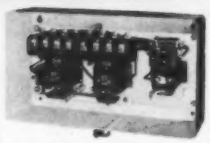


BULLETIN 1232
Pump Control Panels

Complete units for automatic operation of irrigation and oil well pumps. Employ standard A-B Bulletin 709 magnetic starter with manual disconnect switch or circuit breaker in weatherproof enclosure. Wide variety of optional features available.

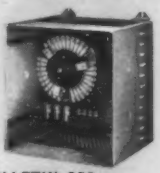
BULLETIN 840
Float Switches

These quality switches are available in a wide range of types for automatic control of motors operating tank or sump pumps. The snap-action switch mechanism assures positive operation, no matter how slowly the liquid level changes.



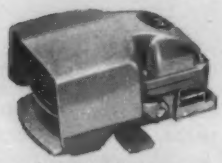
BULLETIN 1270
Automatic Transfer Switches

These switches are designed to transfer powerload to standby supply when normal power fails or drops too low. Automatically returns load to normal supply when power is resumed. Mechanically interlocked.



BULLETIN 555
Speed Regulators

Provide manual speed control of wound rotor motors for either fan or machine duty. When used with magnetic starter, the first step closes control circuit.



BULLETIN 805
Foot Switches

Ruggedly built to withstand the most severe industrial usage. Snap-action switch mechanism features maintenance free silver contacts. The foot switch shown above assures complete "safety" for the operator. Also made without top guard.

BULLETIN 836
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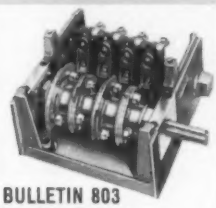

BULLETIN 803
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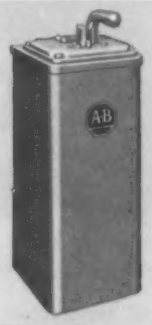

BULLETIN 365
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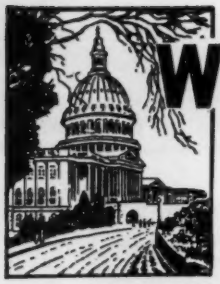

Washington report

By Jack James

Digest of Washington news of special significance to the electrical industry

New local in Baltimore signs with contractors

THE NEW IBEW LOCAL at Baltimore signed a contract last month with the Maryland Chapter of the National Electrical Contractors Association.

Meanwhile, expulsion of the old local was upheld by the IBEW International Executive Council. The old local, Local 28, continued on strike.

Local 24, the new local, claims about 1,000 members, including 200 from Local 28. Before expulsion, old Local 28 claimed about 1,400 members. Many of its members are reported to be working in other areas.

The new contract between the NECA Maryland Chapter and Local 24 runs for two years. Under it, the base rate for journeymen was raised 20 cents an hour to $4.05 on October 1. Five cents will be added January 1, 20 cents next October, and five cents January 1, 1963. The total increase is 50 cents.

Electrical contractors also will pay 7½ cents for health and welfare and one per cent to the international pension fund. These fringe benefits are the same ones that existed in the contract that expired with Local 28.

The International Executive Council of the IBEW upheld expulsion of Local 28 on the grounds that the local refused to end a strike that the IBEW president did not authorize.

The council also found a record of "defiance of this International Union and its laws which the membership had adopted."

The "unauthorized strike" which Local 28 still carries on was over the insistence of the Maryland Chapter of NECA that the industry's Council on Industrial Relations arbitrate contract renewal disputes.

Local 28 refused to agree to a clause that would throw all disputes over any terms of contract renewal into binding arbitration. The IBEW thought it should accept this clause.

The courses now left open to Local 28 are to go out of business, operate as an independent union, appeal to the next IBEW general convention, or press its suit in federal court. A suit is pending charging the IBEW with violating the Landrum-Griffin Act.

Galveston contractors raise electricians' pay

THE ELECTRICAL contractors association at Galveston raised pay for electricians 12½ cents an hour in a one-year contract renewal with IBEW Local 527. The new rate for wiremen is $4 an hour.

Fringe benefits include 7½ cents an hour for welfare, and one per cent of the payroll for the National Benefit Fund.

Board partly reverses decision in firing case

A FINDING AGAINST Denson Electric Co., Jacksonville, Fla., for firing electricians who sought union representation was partly reversed by the National Labor Relations Board.

A trial examiner had found that J. Stanley Denson, president of the company, fired five electricians, and did not offer to let them have their jobs back until five days later.

The trial examiner discounted a statement by Mr. Denson to his employees the work day following the firing: "Boys, I'm sorry for what happened Saturday. I made a mistake. I was completely unnerved, and just to show you I was wrong, I want to pay you for all day Saturday and would like for you all to go back and finish the job."

The board held that this was a perfectly valid offer, made in good faith. Whether the electricians accepted the offer was not shown by the record.

Effect of the board's decision is that Denson is liable for only one day's lost pay for four of the five.

But the board, nevertheless, did put on the record an order against Denson Electric not to discriminate against employees for union activities.

Economist sees boom in building during '62

TOTAL NEW CONSTRUCTION in 1962 may exceed $60 billion, according to Miles Colean, a leading economic consultant in the construction field.

Mr. Colean also predicts that this year new construction expenditures will top $57.4 billion, a 3.3 per cent advance from 1960.

For 1962, Mr. Colean foresees single- and two-family house construction at $17.1 billion, other building construction at $25.1 billion, and non-building construction at $17.9 billion.

This year Mr. Colean predicts that housing construction will be $16.7 billion, eight per cent below the 1960 level. Other building construction will be $23.5 billion, ten per cent above the 1960 level.

And non-building construction for highways, dams, powerlines, and the like will be $17.2 billion, a rise of 7.4 per cent over 1960.

Analysis of these figures shows that Mr. Colean expects only slight gains in single- and two-family housing construction and non-building construction in 1962. But in building construction other than housing—such as office buildings, apartments, hospitals, and hotels—he expects a fairly sizable increase.

September construction advances five per cent

REVERSING THE NORMAL trend, spending for new construction—which usually declines in September—rose slightly.

The amount spent on new construction was $5.4 billion, slightly above August figures and five per cent above the September 1960 figures.

The figures were reported by the Bureau of Census.

During the first three quarters of 1961, total spending on new construction amounted to $42.3 billion, about one billion more

(Continued on page 104)

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A complete, modern laboratory — staffed with quality-conscious technicians — enables us to conduct a diversified and technically thorough testing of all our products. As many as 14 separate checks are made on a given product!

Quality at every manufacturing stage assures you of predicable performance in Southwire products—manufactured to exacting industry standards or to your own particular specifications.

Quality is *automatic* when you specify Southwire — and Southwire Service is unmatched anywhere.

Representative Sampling of Tests Performed on Various Materials and Products

Spectroanalysis
Elongation
Repeated Stress-Strain
Spark
Conductor Resistance
Oxygen and Air Aging
Ultimate Strength
Conductivity
Dielectric
Insulation Resistance
Flame Tests
Moisture Absorption
Capacitance

Southwire Company

Carrollton, Georgia — TErrace 2-6311

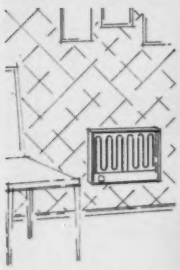
SOUTHWIRE serves the world

For more details on above items, use reply card on page 17

THE *Newest* FOR COMPLETE AUTOMATIC ELECTRIC HEATING

Cavalier

INSTALLS ON THE WALL



Hangs on three screws or toggle bolts on any type wall, yet projects no farther than a wall insert heater.

Model CK-3A, 240 Volts.

• Thermal Cut-Out prevents excessive temperatures. • Fully Enclosed Heating Elements. Safe! • Automatic Control. High quality liquid-filled thermostat. • Solid aluminum reflector. • Close Mesh Grille provides added protection. • Choice of Knock-Out Holes in back or bottom. • Heavy Duty, 240 volts. • UL Listed.

HEAVY DUTY *kwik-tatch*

BUDGET PRICED!

Budget installed anywhere in absolutely minimum time!

Here's a new low priced electric heater with high quality features that make it desirable for complete home heating. Clean, simple design with a pleasing color scheme of warm beige and charcoal grey. Use it anywhere! For complete home heating, office, factory, etc. Four sizes: 1500, 2000, 3000, 4000 watts, all 240 volts.

. . . *and still going strong* - the popular Cavalier CB Series *kwik-tatch*

120 VOLTS, 750, 1000, 1500 Watts and **240 VOLTS,** 1500 Watts

- **Fully Enclosed Heating Elements.**
- **Built-in Automatic Thermostat.**
- **Solid Aluminum reflector and grille.**
- **Choice of Knock-out Holes in back or in bottom.**
- **UL Listed.**

Cavalier CB Series Kwik-Tatch has solid aluminum reflector and grille making it ideal for bathrooms and kitchens . . . or use it almost anywhere—office, factory, shipping rooms, gate houses, etc. Finished in hammertone grey baked enamel.

Cavalier Automatic Electric Baseboard in Two Great Series

SAFE!

CL-A BASEBOARD for fastest possible installation. 250 watts per lineal foot at 240 V.

CBB-F BASEBOARD provides utmost flexibility. 200 watts per lineal foot at 240 volts.

- ***Thermal Cut-Out***
- ***Fully Enclosed Element***
- ***Low Surface Temperature***

New J Series Wall Insert Heaters

Safe! Totally enclosed heating elements. Sizes for every requirement—1.5 to 5 KW. Easily cleaned inside and out in three minutes or less. Automatic thermostatic control. Finished in rich two-tone Silver Craft high baked enamel.

Cavalier Heavy Duty Portables. Easily carried from room to room, stored in summer. 3 sizes.

Cavalier Bathroom Heaters. Nothing to rust or deteriorate! Automatic and non-automatic models.

Cavalier Heating Cable. For installation in plaster and dry wall ceilings, or concrete floors.

Write for descriptive literature: Electric Heating Division, **CAVALIER CORPORATION,** Chattanooga 2, Tennessee

• *Our 95th Year of Quality Products* •

SOMETHING NEW HAS BEEN ADDED

DURO FITTINGS ROUND OUT STEEL CITY'S PRODUCT LINE

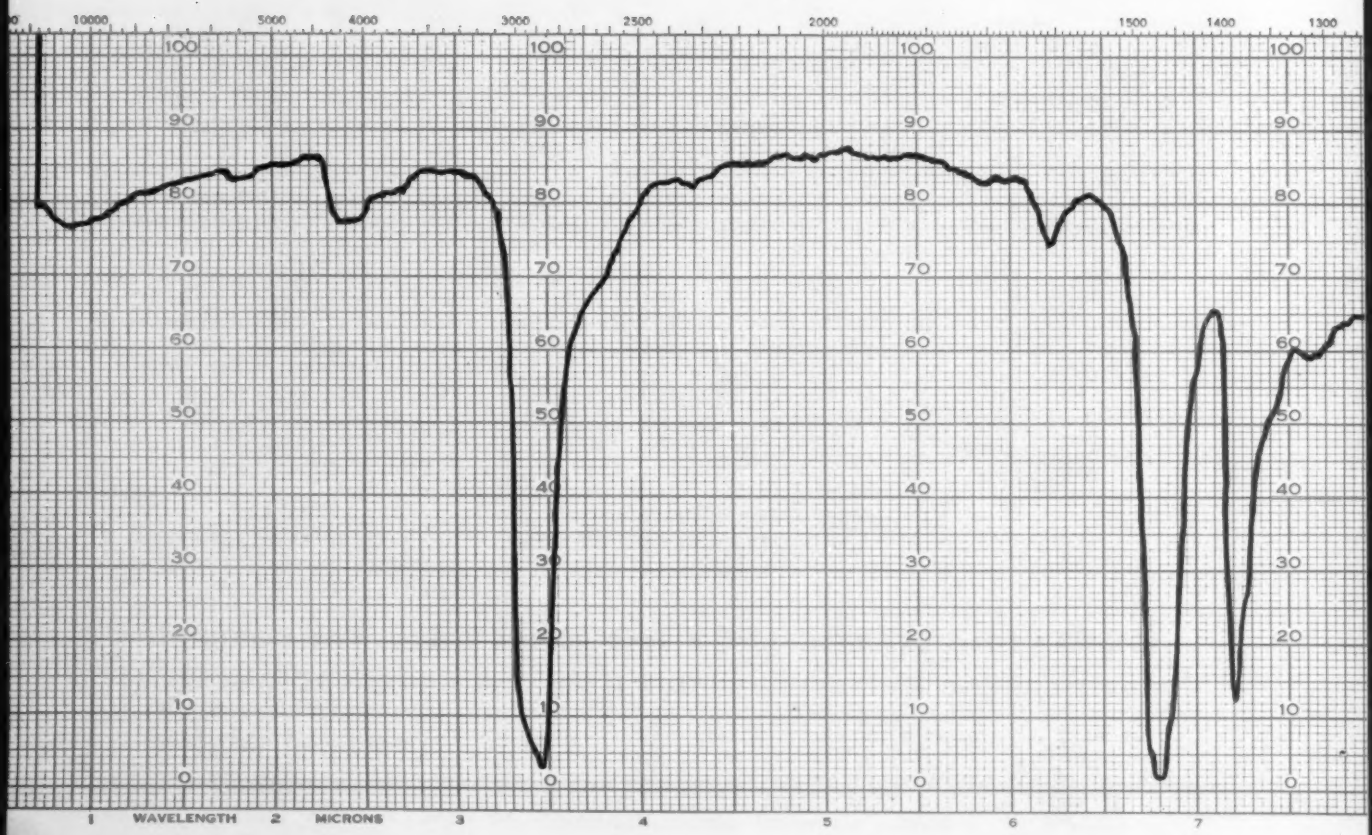
DURO and STEEL CITY PRODUCTS . . . The complete electrical line . . . Now available from one dependable source!

STEEL CITY ELECTRIC COMPANY PITTSBURGH 33, PA.
Subsidiary of American Marietta Company

For more details on above items, use reply card on page 17

If it's electrical cable, pure as the driven snow isn't pure enough. Take the oil saturant for paper cable, for example. Even tiny impurities, one part in 10,000, will affect the performance of the cable. Our Research and Development Department uses an infrared spectrophotometer to establish standards for each type of saturating oil. These standards, using both qualitative and quantitative spectroanalysis, are so high that they are beyond the limits of normal organic analysis. Using spectroanalysis graphs, like the one below, our research department can determine the composition and the molecular structure of organic materials in their original state. Changes in the structure and composition after actual or accelerated service tests can also be detected. Only the oil saturants

This is what purity looks like



For more details on above items, use reply card on page 17

that can pass these tests are pure enough to be used in USS Tiger Brand paper cable.

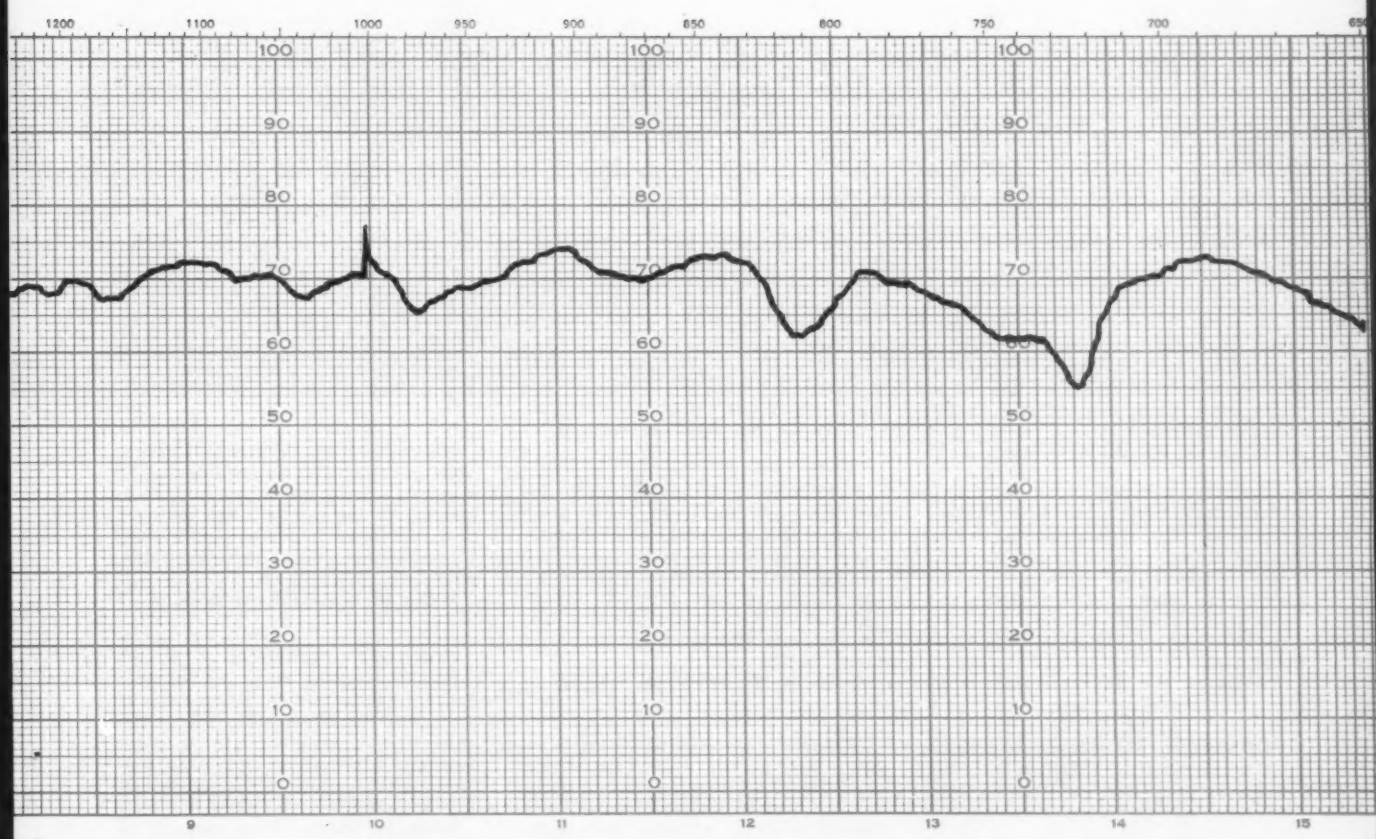
This is just one of the many ways our Research and Development Department makes sure the quality of USS Tiger Brand Wire and Cable is the best that money can buy. Our research laboratory studies and evaluates all the materials used in Tiger Brand products. We are always experimenting with new materials and methods to make a better cable for you. We have the facilities, right in our laboratory, to make all kinds of experimental cables—from control cables up to high voltage cables.

That's why, whatever the job, it pays to specify USS Tiger Brand Electrical Wire and Cable. American Steel and Wire, Dept. 1434, Rockefeller Building, Cleveland 13, Ohio.

USS and Tiger Brand are registered trademarks

American Steel and Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad



For more details on above items, use reply card on page 17

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

GENERAL CATALOG — General catalog of Royal Electric Corporation, Pawtucket, R. I., covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealers catalogs may be secured from Royal distributors.
Write in No. A101 on card, p. 17

WIRING PRODUCTS — Various features of J&S Despard interchangeable wiring devices and detailed information covering this line are offered in a brochure released by Pass & Seymour, Inc., Dept. ES, Syracuse 9, N. Y. Included are such features as Camstrap for quick, easy installation, three-wire grounding, and pressure terminal devices.
Write in No. A102 on card, p. 17

FLUORESCENT BALLASTS—Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., has recently completed the compilation and printing of a 20-page catalog on fluorescent ballasts and their use. Included are data sheets on available Advance ballasts and a comprehensive installation and operation section and testing procedures. Copies of the booklet are available on request.
Write in No. A103 on card, p. 17

ELECTRICAL TAPES — Plymouth Rubber Co., Inc., Canton, Mass., is offering a new catalog on friction, rubber, and plastic tape. The full color folder gives descriptions, sizes, and packing information on their complete line of Slipknot electrical insulating tapes. Detailed specification data charts are included in the 6-page bulletin.
Write in No. A104 on card, p. 17

QUARTZ UNIT—Par Light Manufacturing Co., Milan, Ill., has published a four-page brochure on their new 500-watt—120-volt quartz unit featuring the new incandescent quartz lamp made especially for industry, sports, transportation, and commerce.
Write in No. A105 on card, p. 17

COMMERCIAL FLUORESCENTS —Commercial and industrial fluorescent fixtures are illustrated with complete specifications given in the new loose-leaf catalog from Keystone Electric Manufacturing Co., 2228 East Tioga St., Philadelphia 34, Penn. Shielded and unshielded commercial fixtures, recessed troffers, and industrial fixtures are included.
Write in No. A106 on card, p. 17

GUTH INDUSTRIAL LIGHTING BROCHURE — New 8 page, 4 color brochure by The Edwin F. Guth Company, 2615 Washington Blvd., St. Louis 3, Missouri, describes Guth KOLORKODED industrial lighting fixtures. This unique innovation of color coding luminaires opens a new field in industrial lighting. Folder includes photographs, lighting data, engineering information and complete descriptive data on KOLORKODED luminaires and standard RLM reflector units. Write for your free copy.
Write in No. A107 on card, p. 17

SERVICE PANELS — Information on protective electric control centers for homes, apartment buildings, service stations, and industrial applications is contained in Bulletin PM-385, "BullDog Pushmatic Electric-Centers," issued by BullDog Electric Products Co., 7610 Jos Campau, Detroit, Mich.
Write in No. A108 on card, p. 17

AERIAL CABLES — A 32-page booklet from Olin Conductors, P. O. Box 989, Chattanooga, Tenn., explains how Compresto Cables and PLM Products, "Wrap Around" spacers can be combined in a compact spaced aerial cable system. Design, voltage drop, sag and tension, and short circuit current are also covered.
Write in No. A109 on card, p. 17

FITTINGS AND FIXTURES—Information relative to explosion-proof fittings, fixtures, plugs and receptacles, and accessories is available in a 50-page book illustrating the complete line of these products manufactured by Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis 13, Mo.
Write in No. A110 on card, p. 17

CONDUIT WIREHOLDERS — A new information sheet describing their line of all-purpose conduit wireholders is now available from Knox Porcelain Corp., P. O. Box 2031, Knoxville, Tenn. The illustrated sheet gives installation information, design features, and specifications.
Write in No. A111 on card, p. 17

CONDUIT FITTINGS—A new 24-page catalog, illustrating a complete line of conduit fittings, oval bodies type LB, LL, LR, and T, and lighting parts is now available from Elliott Electric Mfg. Co., 50-30 98th St., Corona, N. Y.
Write in No. A112 on card, p. 17

SATURABLE REACTORS — This efficient method of regulating and controlling electric power for various manufacturing processes is described in a new folder available from Sorgel Electric Co., 838 West National Ave., Milwaukee 4, Wisc.
Write in No. A113 on card, p. 17

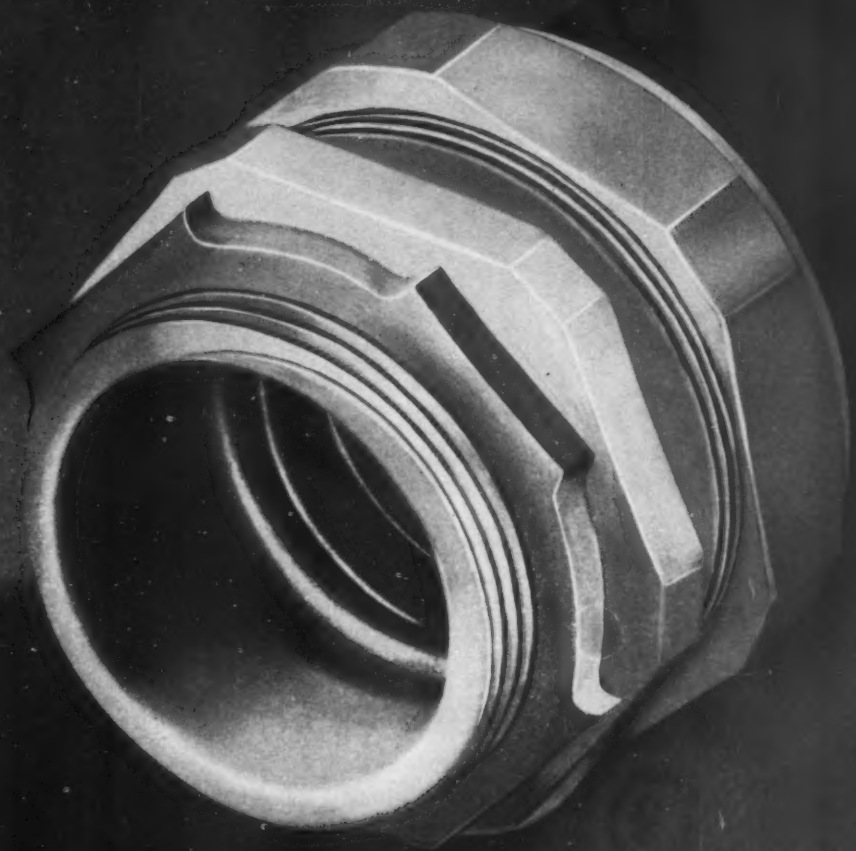
POWER SWITCHES—A new bulletin describing its Type PV power switches, is now available from Line Material Industries, Milwaukee 1, Wis. The bulletin gives complete information on switches rated at 600 or 1200 amperes and having voltage ratings from 7.5 kv to 69 kv.
Write in No. A114 on card, p. 17

MOTOR STARTERS—Design and construction features of their automatic reduced voltage starters are described in a new bulletin released by Allis Chalmers, Milwaukee 1, Wis. Included is motor control engineered for centrifugal compressors, hammer mills, pumps, large conveyors, large fans, motor-generator sets, and other applications.
Write in No. A115 on card, p. 17

HEAVY-DUTY WIRING—Illustrations and detailed descriptions of 27 types of Circle industrial and commercial wiring products are featured in a four-page folder available from Circle Wire & Cable Corp., 5500 Maspeth Ave., Maspeth, N. Y.
Write in No. A116 on card, p. 17

CONDUIT FITTINGS — A new catalog describing their line of conduit fittings is now available from L. E. Mason Co., Boston 35, Mass. The illustrated, looseleaf-type folder contains information on design features, specifications, ordering, prices, and shipping.
Write in No. A117 on card, p. 17

ONLY GEDNEY LIQUID-TIGHT FITTINGS OFFER ALL THESE BENEFITS



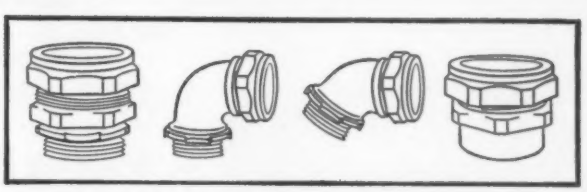
MAXIMUM PULLOUT. Extensive lab testing has proved conclusively that Gedney Liquid-Tight Fittings equal or exceed the breaking point of liquid-tight conduit...connections start tight and stay tight through extra years of service life.

RE-USABILITY. Gedney Liquid-Tight Fittings can be used again and again without destroying the *brass* grounding ferrule ...the liquid-tight conduit is never damaged or made unserviceable in any way.

POSITIVE SEAL. Even the highest viscosity lubricants, oils or other liquids cannot penetrate the never-hardening vinyl sealing ring. The seal also effectively bars chemicals, fumes, dust and other foreign matter...Gedney Liquid-Tight Fittings perform better, longer, more reliably.

WIDE RANGE OF SIZES. Straight and 90° fittings from ⅜ in. through 4 in.—45° through 2 in.—combination rigid to liquid-tight from ½ in. to 1 in.

INSULATED THROAT. Available in sizes ½ in. through 2 in.



INDESTRUCTIBLE MALLEABLE IRON. Heavily plated ...the toughest metal known for fittings. Offers highest thread strength. Resists sharp blows and vibration.

When you can't take a chance on quality, specify GEDNEY Liquid-Tight Fittings. They're the finest you can buy. For descriptive literature, write or call:

GEDNEY

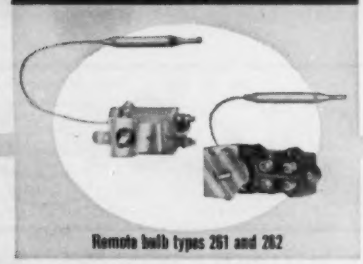
GEDNEY ELECTRIC COMPANY, INC.
1270 Sixth Ave., Radio City, N.Y. 20
Foundry, factory and shipping point: Terryville, Conn.

INSIST ON THE BEST in electric heat THERMOSTATS . . . "WHITE-RODGERS"

Elegant new, type 1A65

World's best seller, type 1A61

Double-pole disconnect, types 1A66 & 1A63



Remote bulb types 261 and 262

BEST– Designed

Elegant appearance created by designer Earl Claus, fits into any decor. Easy to install, simple to wire.

BEST– Performing

Sensitive to *both* radiant heat and air temperature. Silent switch, rugged construction, dependable operation.

BEST SELLERS!

More than 50 manufacturers of electric heating equipment put their brands on these 'stats. Acceptance of White-Rodgers is several times greater than all other makes combined.

BEST for YOU

If you use, install or specify electric heating, insist on White-Rodgers thermostats.

Write for free color folder R-1625.

IN ELECTRIC HEAT THERMOSTATS WHITE-RODGERS IS THE LEADER

WHITE-RODGERS

ST. LOUIS 23, MISSOURI — TORONTO 8, CANADA

ATLANTA 8, GEORGIA • 732 Spring St., N. W.

WR

WHI-234-R

INFORMATION CENTER

Help yourself to free literature and more details on any products mentioned in this issue.

Instead of writing a dozen different manufacturers for free literature and more information on products, equipment, or services, just insert on the cards below the appropriate key numbers of the items in which you are interested. These cards may be used to get information on products mentioned in the following departments (see Contents Page for page number):

Catalogs and Bulletins
New Utility Equipment
New Electrical Products
Advertisements

Be sure to print or write legibly your name and address—drop it in the nearest mail box and

ES pays the postage!

NOVEMBER, 1961

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send this FREE LITERATURE (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send free information on these ADVERTISEMENTS:

Company..... Page..... Company..... Page.....
Company..... Page..... Company..... Page.....

My Name ..... **Position** .....
My Company's Name .....
Address (number and street) .....
City ..... **Zone**..... **State**.....

NOVEMBER, 1961

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send this FREE LITERATURE (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send free information on these ADVERTISEMENTS:

Company..... Page..... Company..... Page.....
Company..... Page..... Company..... Page.....

My Name ..... **Position** .....
My Company's Name .....
Address (number and street) .....
City ..... **Zone**..... **State**.....

These cards can help you get valuable information

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Electrical South
1760 PEACHTREE ROAD, N. W.
ATLANTA 9, GEORGIA

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Electrical South
1760 PEACHTREE ROAD, N. W.
ATLANTA 9, GEORGIA

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

ELECTRICAL FITTINGS — A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrances, SEC, EMT and ground fittings and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N.Y.
Write in No. A118 on card, p. 17

SWITCH & OUTLET BOXES AND ELECTRICAL FITTINGS — Catalogs B-960 and F-960 respectively feature the latest in switch and outlet boxes and electrical fittings. Completely illustrated, they contain over 100 pages of technical and informational data. A unique set of indexes in the fittings catalog make it the easiest reference catalog in its field. Available from the Electrical Fittings Corp., 37-50 57th St., Woodside 77, New York.
Write in No. A119 on card, p. 17

STEEL WIRE—Technical information on Alumoweld, a newly developed aluminum-covered steel wire and strand, is contained in a 12-page catalog, just issued by the Wire and Cable Division of Copperweld Steel Co., 322 Frick Building, Pittsburgh 19, Pa. Illustrated and documented with engineering data, the colorful catalog provides a complete working knowledge of this new material—its properties, advantages, applications and construction practices.
Write in No. A120 on card, p. 17

PRESSURE CONTACT SWITCH—A new 4-page folder (101-K1) and a 12-page folder (105-K) are available from the Kelek Co., 59 Davis Ave., Norwood, Mass., giving new higher load-break ratings, and a summary of test data, respectively, for their Kam-Lok Pressure Contact Switch.
Write in No. A121 on card, p. 17

WIRE PULLING LUBRICANT — Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 4145 W. 150th St., Cleveland 11, Ohio.
Write in No. A122 on card, p. 17

SELECTING FUSES — A 12-page descriptive handbook, Fuseology, tells how to get safest, most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses —how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussman Mfg. Co., University at Jefferson, St. Louis 7, Mo.
Write in No. A123 on card, p. 17

CLAMPS AND STRAPS — Some 600 clamps and straps are listed in a new catalog put out by Victor Specialties, Inc., 775 Main St., New Rochelle, N. Y. Catalog number, size, type, and price are listed for each item in numerical order under general categories. Illustrations are also included.
Write in No. A124 on card, p. 17

ELECTRICAL FITTINGS—Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.
Write in No. A125 on card, p. 17

LIGHTING PANELBOARDS — A 4-page descriptive folder featuring a line of plug fuse and toggle switch panelboards for lighting control circuits is now available from Frank Adam Electric Co., 3650 Windsor Pl., St. Louis, Mo. The folder includes box sizes, details of construction, wiring gutters, special features, and catalog numbers.
Write in No. A126 on card, p. 17

ELECTRICAL ENCLOSURES — Catalog Number 6061 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta 18, Georgia, is a well organized compact 132 page manual. The Catalog is divided into two distinct sections, one covering products for the Utilities, and the other section covering products for the Electrical Contractor. This Catalog offers complete descriptive information, prices, and specifications on all items in the B & C line of Electrical Products and Devices. Copies are available free of charge to Distributors, Contractors, Architects and Engineers, and Utilities.
Write in No. A127 on card, p. 17

DISTRIBUTION EQUIPMENT — Kuhlman Electric Co., P. O. Box 288, Birmingham, Mich., offers an eight-page catalog, CS-201, describing their line of distribution transformers of the single phase conventional type, 167 kva and below. Also available is an information sheet, CS-204, on the Kuhlman externally operated series-multiple switch for pole-type transformers 5-167 kva.
Write in No. A128 on card, p. 17

DUAL ELEMENT FUSES—A recently published catalog from Great Western Fuse Div., El-Tronics, Inc., Jamestown, N. Y., gives charts showing load data, as well as diagramed illustrations explaining features of dual element fuses. Ordering information and a cross reference guide of sizes is also included.
Write in No. A129 on card, p. 17

LAMP GUIDES—Sylvania Lighting Products, 60 Boston St., Salem, Mass., has made available three lamp guides containing general information, technical data, and catalog listings on their lines of fluorescent lamps, incandescent lamps, and mercury lamps.
Write in No. A130 on card, p. 17

ELECTRICAL ENCLOSURES — Adjustable and non-adjustable floor boxes, watertight outlets for floor use, and conduit hangers are shown in the 20-page revised catalog #750 available from Fullman Mfg. Co., Latrobe, Pa. Adjacent to each photograph in the catalog are specifications for the product pictured.
Write in No. A131 on card, p. 17

ELECTRICAL TAPES—Eight-page Accurate Tape bulletin details data on rubber, friction and plastic tapes. Bulletin features laboratory test results, includes complete packaging information. Immediately available from Accurate Manufacturing Company, Garfield, New Jersey.
Write in No. A132 on card, p. 17

PLUG-IN REELITE — Complete details about Appleton's lightweight, portable automatic Reelites are given in an attractive 4-page catalog insert. These devices find application in a wide range of occupancies: garages, loading docks, garment industry, construction crews, warehouses, machine shops, etc. Write to Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill.
Write in No. A133 on card, p. 17

Hats and other items are lighted for careful scrutiny by the customers.

Recessed wardrobes are individually illuminated with fluorescent lamps.

Department

The desire to show

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✓

By Fred L. White, Lighting Engineer, The Popular Dry Goods Co., El Paso, Texas.

◆ We were forewarned that our department store sales people would have to get used to living with, and learn how to take advantage of, our new type lighting, which Edgar Kober of the architectural firm of Burke, Kober & Nicolais of Los Angeles refers to as "accent lighting."

Our current multi-million dollar remodeling and expansion includes a new lighting concept. Burke, Kober & Nicolais, who specialize in department store architecture, contend that lighting should provide more than just adequate illumination. They believe that lighting, properly designed and used, should also function to enhance the value and desirability of merchandise.

In this respect, Mr. Kober insists, as far as customers are concerned there should be no conscious awareness of lighting, display fixtures, aisles, or flooring materials. Lighting should direct their interest upon the merchandise being displayed.

For example, the silverware and gift department was a most difficult department to illuminate efficiently. Here the quantity of light, and the placement of it, were not the answer. The quality of light, however, was of utmost importance.

A brilliant, hard light has the tendency to give silverware a chrome-plated appearance. Less light of the same caliber gives silverware an unflattering look.

store lighting accents merchandise

true color values brought consideration for the quality of illumination

To give silverware, pewter, china, and crystal their natural look, we used recessed ceiling overhead fixtures with 150-watt Verd-A-Ray incandescents, augmented with fixtures lighted with Verd-A-Ray custom blend fluorescents.

With this type lighting, there are brilliant highlights without glare, and there are no hot spots. Yet, due to the placement of the ceiling overhead fixtures, each with a 60-degree coverage, there is a gradual falling off of light intensity along the counter tops. But this is so gradual it is not obvious to the shoppers.

Without the shoppers being aware of it, their interest is directed upon the items being featured without detracting from the other merchandise.

Too, the lighting in this depart-

Before the remodeling and new lighting the interior was dark and drab. Inadequate illumination made it difficult to compare color values.

Ceilings were dropped four feet. Apparel is illuminated by recessed fixtures which use 300-watt incandescent units.

ment is so designed that it keeps pulling the shoppers forward. Thus, their interest has a continuous rather than a definite terminal point.

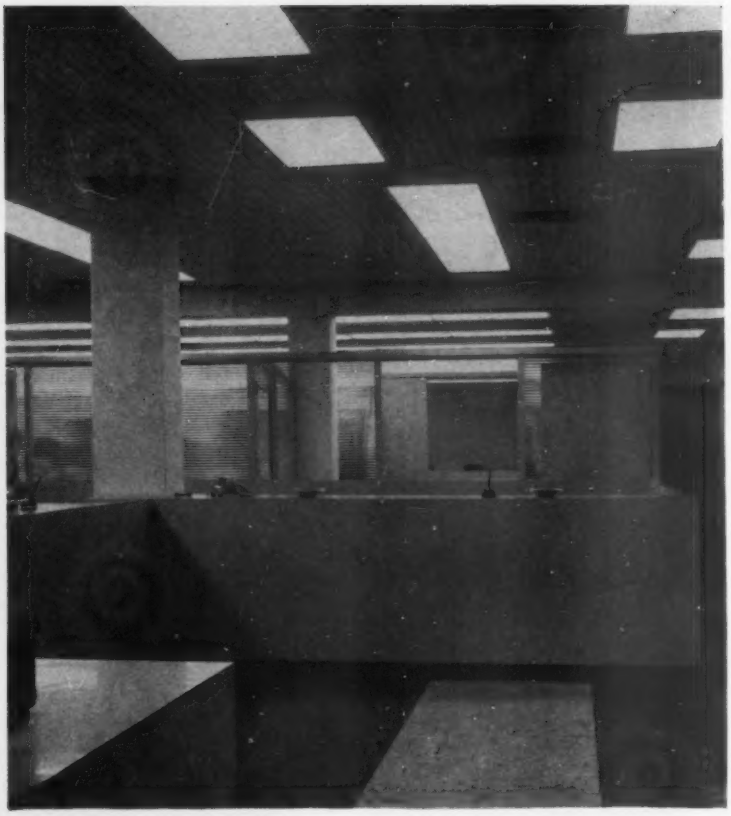
We are using the Verd-A-Ray fluorescents on our fifth floor, which is devoted to fashions. The floor is illuminated with recessed ceiling overheads with a conventional 300 - watt incandescent, placed on seven- by ten-foot centers.

But along the walls, recessed wardrobes displaying the garments are individually lighted with custom blend Ver-A-Ray fluorescents, a 40-inch and a 15-inch to give full length coverage. This prevents the falling off of light intensity at both ends of the display.

Shoppers can thus see garments as they look under daylight illumination, the judging light for most women. With this daylight quality lighting, even the different shades of blacks are distinguishable at first glance. And a midnight blue stands out from among the blacks in a conspicuous manner.

Our fashion buyers and merchandising staff keep telling us

(Continued on page 102)



Footcandle levels vary from 75 to 90 on desk tops in the office area.

An important criterion in the design of the new lighting was that the result would be flattering to china and silver.

NAED holds course on credit and collections for Southern members

A survey of distributor ideas and careful planning made course unusually valuable to participants

Credit and collections expert Edward O. Kallmann served as instructor.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ "I believe the organization and presentation of this program is the best I have ever experienced in any industry association group," typifies response to the Credit and Collections Course which was held earlier this month for Southern region members of the National Association of Electrical Distributors.

Presented in Atlanta at the Hilton Inn, the course is the first in a series undertaken by the new NAED Management Institute, which offers a program of seminars and training courses in specific subjects of interest to electrical distributor management.

Also invited to take part in this particular training course were sales and financial people from manufacturers who distribute all or a major portion of their products through electrical wholesalers.

Credit and collections was selected as the first course in the management institute program because it is such a vital aspect of the electrical construction and maintenance business. This particular course took more than a year and a half to develop.

From the very beginning, emphasis has been placed upon one primary goal: everything in the course must be definite and to the point, practical, and easily applied to everyday situations—and down to earth in that each unit of instruction is based upon the observed and clearly defined needs and interests of the men and women on the job.

The credit and collections course has been given previously this year in the association's Eastern, Western, and Central regions. Atlanta was selected for the Southern region course because of its central location, hotel accommodations, and transportation facilities.

Southern region members of NAED were able to take advantage of the experience gained at the previous three courses given since the NAED Management Institute was formally launched last April.

The NAED Southern region is composed of electrical wholesale distributors located in Alabama, Florida, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Arkansas, Louisiana, Mississippi, Oklahoma, and Texas. The total association membership in these states is more than 290 main and branch houses.

Because of the very nature of the credit and collections course, attendance has had to be limited. Packed into the three days is the type of information that ordinarily would take six weeks to cover.

Material covered

Material covered during the Southern regional course included the following: organization and function of the credit department; appraising risks; credit investigations; legal aspects in managing credit; sources of credit information; financial statement analysis; collections; documentary credit; banks, factors, and finance companies; and creditors' legal aids.

The three-day program was broken down into ten separate sessions or teaching units. Each of these was presided over by Edward O. Kallmann, executive vice-president of the Stationers and Publishers Board of Trade, New York City, who acted as instructor and discussion leader.

He is a thoroughly trained expert in credit and collections, and has had wide experience in college-level business teaching involving various phases of this subject. Mr. Kallmann also is a former board of governors member of the credit interchange bureau of the Hardware Manufacturers Div., National Association of Credit Men.

In addition, he is adjunct professor at Pace College, New York City, and has been guest lecturer at Long Island Technical Institute, Fairleigh - Dickinson University (New Jersey), and Michigan State University.

Following the NAED primary requirement that it be a down-to-earth course—useful as well as interesting—the association, in developing the course, went directly to those in the wholesale electrical distribution industry—those who have credit responsibilities—to get their first-hand opinions on what they wanted to see covered in this training program.

After this first step was accomplished, a checklist of the most important items concerning both credit and collections was mailed to credit managers in NAED member companies. This was done to

(Continued on page 103)

Service from one-stop supply firm

Newly opened outlet offers expert lighting consultation, fast delivery,

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

By Harry J. Miller, Field Editor, Sarasota, Fla.

◆ "The supply house that relies upon a 'satellite' operation to serve the needs of its electrical contractors does not fully recognize its responsibilities to its customers."

So says Fred Braverman, president of Consolidated - Southern Electric Supply, Inc., which recently opened a most comprehensive outlet in Bradenton, Fla.

"The future of the lighting business in today's competitive merchandising revolution demands—and is inalienably tied to—service to the contractor," Mr. Braverman adds, "and this implies stocking fixtures and other lighting accessories in such depth that he can do all of his electrical shopping at one location and avoid chasing all around for an item."

It is obvious that lighting sales may be snagged because of the inability of the contractor, and, in turn, his supplier, to obtain needed units promptly. This is particularly an irksome situation in small towns in which electrical suppliers establish minor satellite stores that carry only a sketchy stock of merchandise.

Such was the case in Bradenton until Mr. Braverman opened a full-fledged lighting and supply operation in a large-scale enterprise that is proving mutually profitable to the spacious outlet and its customers.

Mr. Braverman says: "If the supplier is to serve his customers, he must serve them well."

In line with this dominant theory, the contractor finds service at the Bradenton supply house embracing a variety of aids unparalleled in this west coast Florida area.

Aside from being a one-stop

The firm has stocks of or access to most of America's major lines of fixtures, supplies, and accessories.

boosts contractors' wiring profits

financial advice, and the advantages of an extensive supply inventory

supplier for the biggest operators, the Bradenton store's lighting department is operated by lighting engineer Leonard H. Leetzow, a veteran of many years in the electrical industry.

Mr. Leetzow's department functions in the role of advisor and diagnostician, and provides the know-how that enables a contractor to bid wisely and install an acceptable lighting application—at a profit. In addition, the firm's electrical engineers stand ready to offer assistance.

"Service" is a term very loosely applied in some organizations. In the case of this new outlet, service is a most important facet of its operation. At no charge to the contractor, Mr. Leetzow will com-

Consolidated's planning service helped the sale of this installation.

An artistic planting arrangement complements the dis plays of patio, outdoor, bathroom, and kitchen fixtures.

A contractor installing lighting can get immediate delivery of virtually every item he needs from Consolidated-Southern.

Right: Close to 500 fixtures are wired through low-voltage circuitry (ganged switches can be seen at right). Displays are kept high so they won't cut off vision to other wall and ceiling areas. Every fixture has the price clearly displayed. Heaters and intercoms are also shown.

pletely design any specified lighting result required of the contractor. Or Mr. Leetzow or his aides will go out to the job to make a layout or sketch of a residential or commercial application.

The contractor may elect to dispatch his prospect to Mr. Leetzow, who then takes time out to discuss, design, and help the contractor close the sale.

The firm's outside field men are far from being only salesmen or order-takers. They are qualified through training in illumination engineering and will sit right down with the contractor and give him the personal help he needs.

In Mr. Leetzow's opinion, when it comes to residential lighting, each home, regardless of its size or location, should reflect the personalities and personal preferences of the individuals living there.

It is in this area that the supplier's lighting engineers can stress an important point—that lighting must be considered an integral part of interior design, as important as any major appliance, furnishings, carpeting, or painting.

Without the necessary lighting, the full effectiveness and beauty of any of these items would not be fully appreciated.

Mr. Leetzow, who works closely with architects on lighting layouts, cites an instance where a customer's idea of lighting a table was to have a 150-watt ceiling fixture above it. She wanted to buy a starlight fixture having eight tiny 20-watt bulbs.

"Thus with 160 watts she felt dead sure she'd have the needed light, without considering that there is just too much light distribution from such a fixture. If you let her have her way, you've got a dissatisfied customer hanging around the contractor's neck."

Just about everyone at Consolidated participates in helping the contractor. Policy, direction, and inspiration come regularly from top management and sift down to counterclerk level, from which problems presented by contractors are communicated as far up the management ladder as is necessary for speedy resolution.

For example, the firm doesn't wait to route orders. Mr. Braverman considers the store's 20-mile radius as a single metropolitan trading area, which means a contractor can have delivery within an hour—or have a single item sent out at once in an emergency. Obviously this means having ample stocks and more automotive equipment—both lacking in any satellite operation.

As an example of what this entails, Mr. Braverman recalls being ridiculed for stocking four-inch Greenfield, a supposedly never-needed item in this under-industrialized section. Yet within two weeks after opening, a breathless and much-harrassed contractor arrived to demand some at once.

He got it; he maintained goodwill with his industrial customer, and his continued patronage indicates his appreciation of the complete stocks carried in the Bradenton unit.

The unit opens an hour before and remains open an hour later than an ordinary establishment to expedite deliveries, and delivery trucks are rolling by 7:30 a.m. Says Mr. Braverman, "With the wage scale what it is today, consider what it means to a contractor working a dozen men, to have them in action half an hour earlier."

Credit facilities

Mr. Braverman's service extends to giving the contractor access to the firm's credit facilities. "This serves the contractor in two ways," says Mr. Leetzow. "We can discover if the contractor's customer is stable financially and because we've come up from the

(Continued on page 102)

Rural customers buy electric heat

Contractor promotes electric heating sales to rural homeowners and business people who are dissatisfied with liquid petroleum gas

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

By S. W. Ellis, Field Editor, Little Rock, Ark.

◆ A small white building, behind a wide roadside drive-in, is the profitable showroom and office for an electrical contractor making growing profits for himself on electrical heating which he promotes vigorously to dissatisfied users of liquid petroleum gas.

With eye-catching signs on the front and sides of the building, a daily radio program, personal calls, and a display floor that helps to close contracts for electrical heating jobs, L. W. Campbell, of Campbell Electric Co., Little Rock, Ark., creates his own opportunities to sell all-electric heating to rural homes, dairies, fur farmers, horse stables, and other rural business people and hobbyists.

Mr. Campbell sells his heating jobs to city people also. But he sees a special and growing demand for electrical heating among people living beyond natural gas lines. He picked the suburban location for his specially planned building to catch the eye of the rural homeowner and farmer. He beams his advertising and promotion to this electrical heat market.

No prospect is easier to sell electrical heat than one who is now using liquid petroleum gas, he insists. He uses facts and figures to show the prospect that operating costs of electrical resistance heating can compete with liquid petroleum. Installation costs also prove interesting by comparison.

Wall insert units heat the breeding barn at a rural chinchilla ranch.

Mr. Campbell's crossroads location has a picturesque appearance and the building shoulders a tree-covered hill. Cars can readily swing into the parking area. Entering the front door in summer, the customer feels the pleasant air conditioning. In winter, he senses the warmth of baseboard and electrical wall insert heating.

Prominent on the sales floor is the all-in-one display unit of baseboard and wall heating units. Mr. Campbell uses this display to demonstrate the electrical heating equipment he can install readily in homes or buildings already constructed.

Most of his customers live in homes or do business in structures heated by other methods. They want to know immediately if remodeling the older home for electrical heat is a worthwhile expenditure.

Typical of the way in which some customers are sold electrical heating is a chinchilla ranch owner who had been noticing the contractor's place of business, after listening to his radio ads.

(Continued on page 101)

Cove lighting and pinpoint spots give living room a blending of direct and indirect illumination.

Well-equipped house has 600-ampere

Remote control lighting, an intercom, and air conditioning are some

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers
- Consulting Engineers

By Bob King, Southwestern Editor, Dallas, Texas.

◆ More-than-adequate Housepower might be the term for the recently completed home of Charles P. Davis, owner of the Davis hardware stores in Austin, Texas.

Electrical contractor Roy Jackson was responsible for the lighting and power requirements for the private residence.

Mr. Jackson said that the early American style house, with its 8,000 square feet of living space, has a 600-ampere main service of the cartridge fuse type, fed from the utility company's lines by a 250,000 MCM underground cable through three-inch rigid conduit.

Surface control panels and submains are located just inside the two-car garage which forms part of the basement and recreation area of the two-level home. Each panel is clearly marked and identified as to the circuits it controls. The house has a total of 130 circuits.

Wiring to the heat pumps is of the three-phase, four-wire delta connected system with two 110-volt legs, a high leg of 180 volts, and a neutral ground, according to electrician George Lindsey, who did most of the actual wiring in the dwelling.

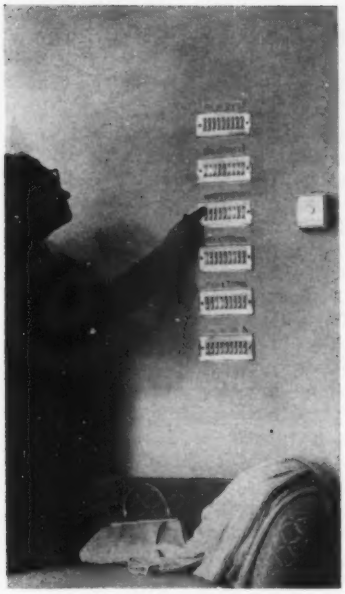
The two heat pumps, each rated at five tons, provide year-round heating and cooling requirements for this Total Electric Gold Medallion Home. The heat pumps are fed from the submains with two 110-volt lines providing 220-volt circuits. Similar wiring serves the washer and dryer. One air filter and circulating unit is in the basement, the other unit is located in the attic.

The living room, dining area, and the three bedrooms on the upper level all have cove lighting. Pinpoint swivel type lighting fixtures have also been installed in the six-inch acoustical tile ceiling to give a combination of direct and indirect lighting.

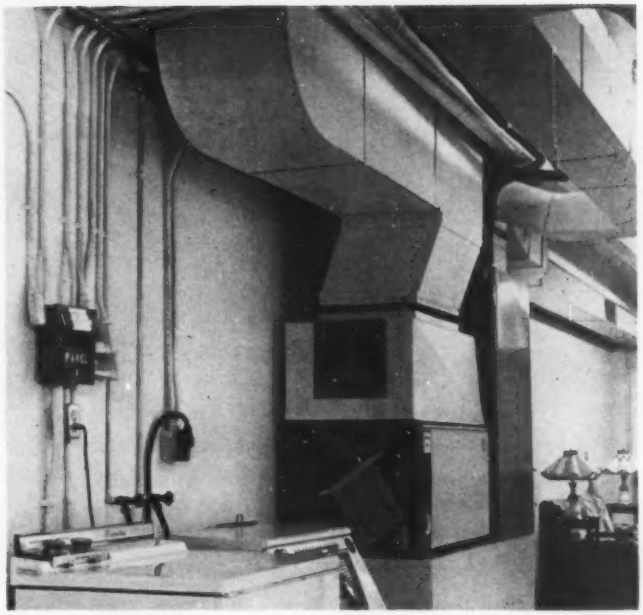
The pinpoint lighting highlights individual pieces of furniture, the two fireplaces in this area, paintings, and other objects. Lighting throughout the house is controlled by Remcon touch - type wall switches.

A total of 151 of the three- and four-way low-voltage remote control switches were used. Mr. Lindsey said also that more than 10,000 feet of No. 18 three-conductor wire was used in the house for the low-voltage system.

In this type of low-voltage sys-



Owner Charles Davis is demonstrating one of the master control switches for the lighting system.



Another circulating air and filter unit like this one, located in the basement, is situated in the attic of the Davis home.

service

of the features

tem, a thermal element is used in the relays which includes a small built-in transformer. When six volts are applied at the switch, a bimetallic strip expands and closes the 110-volt contacts. Pressing the off side of the button completes a similar cycle on that side.

Master switches in the large bedroom control all lighting on the upper level of the house. Other touch-type switches are near room entrances and other convenient locations.

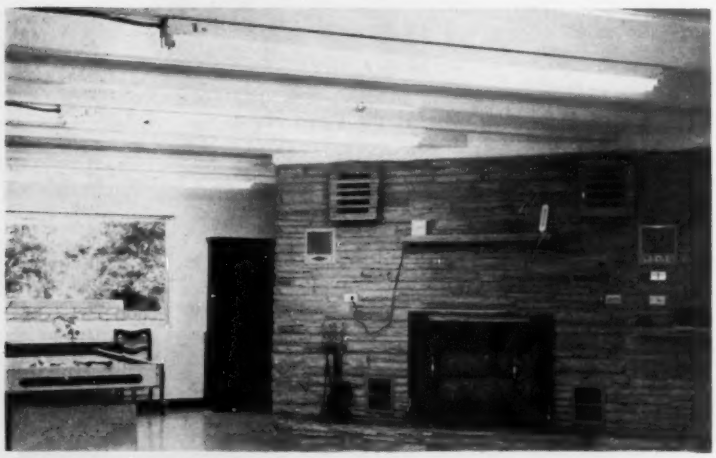
Recessed lighting was specified in the three bathrooms on the upper level, and incandescent was preferred to fluorescent. The bathrooms also have 220-volt circulating fans recessed in the ceiling. A recessed fixture is also above the shower, and decorative incandescent fixtures were installed near the vanity and basins.

Each bedroom has an attic fan and 220-volt outlets for space heaters should they be needed.

Outside lighting includes floodlights mounted under the eaves and two post lights. The two heat pumps are under the ramp, seen at the right.

Electrician George Lindsey looks over a wiring diagram while standing by surface control panels and submains for the house.

Outside the garage are five-ton heat pumps and main distribution panel. Three-inch conduit is of the cartridge fuse type.



Lighting for the well-equipped basement recreation room is provided by four overhead fixtures, each having two eight-foot fluorescent tubes.

Cove lighting in each bedroom is found on two sides, with a 150-watt recessed fixture in the center of the ceiling.

Closets in each of the bedrooms are illuminated automatically by means of flush-mounted door switches.

Pinpoint and recessed lighting is also featured in the kitchen, which has two built-in ovens—one electronic—and two built-in refrigerator-freezer combinations.

Also in the kitchen are a dishwasher, a waste disposal, and a built-in tabletop stove unit. The electronic oven is capable of cooking a turkey in 35 minutes and baking a potato in seven minutes.

Leading up through the flooring from the circuit breaker type auxiliary panels in the garage, three No. 6 rubber insulated cables in flexible conduit serve the two ovens and the large tabletop stove.

A complete intercom system is located throughout the house with units in each room. The master controls are built into the fireplace in the living room, as is the built-in stereo high-fidelity system.

There are 140 outlet plug receptacles for 110-volt appliances in the house, and 18 outlets for 220-volt. The recreation area on the ground floor level, which houses the indoor heated swimming pool, also has a large recreation room and an adjoining gun

(Continued on page 98)

Pinpoint lights accent the fireplace, furniture, and other objects in the living and dining areas.

This marker frees one man from tracing cables

The Amprobe Cable Tracer* enables you—by yourself—to trace ten uncoded circuits simultaneously ten times faster than any other method. Simply plug one end of the conductors to be traced into the markers (there are ten of them), the other ends, in pairs, into the pocket-sized Cable Tracer, press the button, and a number lights up to provide unmistakable identification. See your distributor or write today for more details.

Here are some typical, broad category applications:
■ Trace commercial and residential conduit wiring.
■ Identify circuits in intercom and p.a. equipment.
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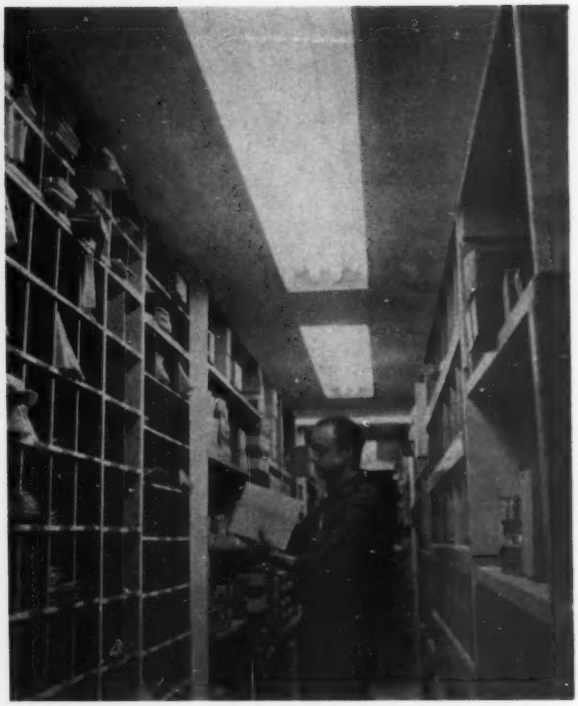
For more details on above items, use reply card on page 17

Contractors tell how

A wide opening from the second level located over the loading door saves steps when transferring materials.



Stockroom manager Alan Cook finds placing stock in bins easier with the illumination now at 150 footcandles.

Lighting gets prime consideration during remodeling

By Milton L. Klein, President, A/C Electric Co., Inc., Washington, D. C.

◆ We made ideal lighting a prime consideration in our remodeled stockroom.

In order to double the square footage of this area, a second level was constructed midway between the floor and the 14-foot ceiling. This entailed replanning our lighting for maximum efficiency so that the smallest binned item would be readily visible and quickly accessible. Good lighting is a money-maker because it saves time, as well as employee wear and tear.

In our new low ceiling of seven feet we installed recessed two-tube fixtures of the eight-foot fluorescent slimline industrial type throughout the aisles. Providing our stockroom with uniform, even lighting of 150 footcandles at eye level, these fixtures make clearly visible and easily read the small letters on each narrow strip of label identifying an item stocked in a bin.

Recessing these open fixtures for maximum efficiency, we painted the ceiling white for better diffusion of light. The ceiling recesses became low pallet like platforms on the floor of the second level for the storage of surplus conduit, cable, and Greenfield. Two eight-foot stairways, each two-feet wide and well illuminated, furnish access centrally and at the side area adjoining the loading area.

An opening from the second level right above the loading door permits dropping heavy conduit and cable to a waiting mechanic below. Thus, stock personnel are spared running up and down carrying heavy materials.

In the replanning and reconstruction of our stockroom we placed wiring devices, fast-moving items in demand by the retail trade, at the front and main counter to eliminate steps and loss of time. Bins at the rear house wire, cable, and heavy bulky materials, in addition to tools.

With a second level for surplus we can now take advantage of quantity buying.

Innovations reduce house wiring costs

By M. A. Walker, M. A. Walker Electric Co., Oklahoma City, Okla.

◆ We are specialists in residential wiring, and labor is the most costly thing we use.

We are always ready to spend more on material or tools when we can come out ahead on labor. We are now saving $7,000 to $10,000 a year in on-the-job labor costs after a couple of innovations.

One of the cases in point is a switchbox which I designed to save time and do a better job—

cheaper—with a sheetrock construction.

Most types I found were hard to fit to sheetrock, most tended to cause humps, and there was no proper gauge to go by on projection from the stud.

I went to a box manufacturer with my idea and the manufacturer started making the boxes for us. It's a bracket type box, nailed to the stud, with the box projecting past the stud to fit flush with sheetrock. The vertical box gives absolutely constant projection, with no hump, and you don't have to trim or recess the stud. The new box is made for normal ½-inch sheetrock.

The box has greatly simplified and speeded our wiring process where sheetrock is used. Other changes over a period of time have also made our work more efficient.

I believe we were the first in this area to use the full capabilities of the electric drill for house wiring. Previously we used a handsaw to notch two-by-fours.

When we found we could use an electric drill with a large-size bit to notch the two-by-fours, letting the bit cut through the edge of the stud, we were then doing such work in one-tenth the time.

The crimp type connector was a real boost for us, too. The insulated copper sleeve which makes a connection and seals itself at the same time was a real gain over soldering and taping joints.

Mr. Walker designed the switchbox to project past the stud for accuracy when using normal ½-inch sheetrock.

Using trailers has cut down substantially on material loss and theft.

Three trailers replace field shanties, serve as offices and storage houses

◆ Dyer Electric Company of Birmingham has found an ideal replacement for field-job shanties: three 30-foot trailers purchased second-hand from a trucking company and re-outfitted as combination field offices and storage houses.

Dyer has been using the trailers almost five years now and superintendent Earl Clark reports satisfaction-plus.

"The trailers long ago paid for themselves," he said. "They provide more office work room, more storage space, and have cut down substantially on loss and theft of materials."

The company bought the trailers for about $600 each and spent an additional $300 or so outfitting and repainting them. The company name appears in king-size letters on the outside.

The trailers are eight feet wide and nine feet high. The partitioned office is seven by eight feet, with a plan table and files for job information.

The rear portion provides bins and shelves for parts and there is ample floor room for bulky materials and tools. The trailers are wired for electric heat and lighting, and have outside receptacles for power tools.

For a major installation by Dyer, a trailer is loaded with roughing-in materials and dispatched to the job site, sometimes

(Continued on page 102)

Trailers are equipped with bins and shelving. Up front is the office.

Application of Code requirements

Article 513 governs electrical wiring and equipment in aircraft hangars, and gasoline dispensing and service stations are covered by Article 514

This article should be especially helpful to the following readers:

- Electrical Contractors
- Electrical Utilities
- Electrical Wholesalers
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

By Walter R. Stone, Contributing Editor on Code Rules, Utica, N. Y.

◆ Article 513 of the Code governs electrical wiring and equipment in aircraft hangars.

A hangar is defined by Section 513-1 as an occupancy which is used for the " . . . storage or servicing of aircraft in which gasoline, jet fuels, or other volatile flammable liquids, or flammable gases, are used." Areas containing only aircraft which have never been fueled or which have been drained and effectively purged of all traces of fuel are exempt from the special requirements of aircraft hangars.

The extent or boundaries of hazardous areas of some Class I locations are difficult to define for the reasons discussed in February and March. For some of the special occupancies which are defined as Class I locations, however, the Code is more specific in its definition of such boundaries.

But in the case of aircraft hangars, although specific in one respect, some of the boundaries as defined in Section 513-2 are of a type which shift from time to time depending upon the exact placement of each aircraft.

Establishing boundaries

Since aircraft in most hangars could be placed in any part of the working areas of the hangars, it is impossible to set a permanent horizontal or vertical limit to the hazardous area unless the limit is placed at the maximum possible horizontal dimensions and vertical height which would be required when the entire hangar was completely filled with aircraft.

Even then the size of the craft would affect the vertical boundaries. Hence, the largest and tallest craft which is likely to be placed in any hangar must be assumed as occupying all available areas when the boundary limits are set for hazardous areas.

This usually is the working assumption of inspection authorities who must rule on the extent of such boundaries. This is in regard to permanent wiring and equipment, of course, which cannot be altered each time planes are moved about from one part of the hangar to the other.

The difficulty in arriving at the horizontal and vertical boundaries of hazardous locations in hangars results from Paragraph (c) of Section 513-2 which states, "The area within 5 feet horizontally from aircraft power plants, aircraft fuel tanks or aircraft structures containing fuel shall be considered to be a Class I. Division 2 hazardous location which shall extend upward from the floor to a level 5 feet above the upper surface of wings and of engine enclosures."

Area classification

Paragraph (a) of this section classifies any pit or grade below the level of the hangar floor and extending up to the level of the floor as a Class I, Division 1 location. And Paragraph (b) classifies as a Class I, Division 2 location any area extending from the floor up to a level 18 inches above the floor.

This includes areas adjacent to the hangar but which are not suitably cut off from the hangar by walls or by elevation which would effectively prevent the communication of gases or vapors from the hazardous to the non-hazardous areas.

If elevation alone is to be utilized as a barrier to the communication of gases from one area to another, the question arises as to what would constitute an acceptable minimum height of the elevation of the non-hazardous area above the hangar floor.

This minimum could be not less than 18 inches in any case. But this minimum would apply only at points where no part of the aircraft structure could come within five feet horizontally of the intended barrier.

But at points where this distance was less than five feet, the height would then have to be five feet above the highest point of the upper surface of the wing and engine enclosures.

Paragraph (d) of Section 513-2 states, "Adjacent areas in which hazardous vapors are not likely to be released such as stock rooms, electrical control rooms, and other similar locations, should not be classed as hazardous when adequately ventilated and when effectively cut off from the hangar itself by walls or partitions."

It could be inferred from this paragraph that ventilation alone might properly be considered as an effective means of separating the non-hazardous areas from the hazardous areas at such points as doorways or passageways leading out of the hangar when such doorways or passageways are not elevated above the hangar floor.

Such walk-through areas have always been a bane to inspection authorities, for it is seldom that one is found leading from a hazardous area which is elevated, whether the hazardous area is an aircraft hangar, a garage, or a service station.

All wiring and equipment in areas which are defined by Section 513-2 as Class I, Division 2 locations in aircraft hangars are required by Section 513-3 to be installed in accordance with the applicable provisions of Article 501.

Section 501-4(b) requires that the wiring method be threaded rigid metal conduit or type MI cable.

Where flexible connections are required, flexible metal conduit or flexible cord which contains a grounding conductor and which is approved for extra-hard usage is permitted.

Installation of wiring

Section 513-3 requires all wiring in or under hangar floors to be installed in accordance with the applicable provisions of Article 501 for Class I, Division 1 locations. Section 501-4(a) requires that the wiring method be threaded rigid metal conduit or type MI cable.

Where flexible connections are needed, explosion-proof flexible connectors are required. All boxes, fittings, and joints are required to be of the explosion-proof type.

Section 513-4(a) states, "All fixed wiring in a hangar, but not within a hazardous area as defined in Section 513-2, shall be installed in metallic raceways or shall be type MI cable, except that wiring in non-hazardous locations as defined in Paragraph 513-2(d) may be any type recognized in Chapter 3 of this Code."

What this means is that all wiring in the hangar which is above the hazardous areas is required to be in metallic raceways or type MI cable; but that non-hazardous areas which are adjacent to, but suitably cut off from, the hangar by walls or partitions or by elevation, such as offices and storerooms, may be wired by means of any approved method of wiring listed in Chapter 3, such as nonmetallic sheathed cable or armored cable.

Paragraph (b) of Section 513-4 requires that any pendants for lampholders or receptacle outlets in areas which are not within the hazardous locations be of the type which contains a separate grounding conductor and which is approved for extra-hard usage. The same type cord is required also by Paragraphs (c) of this Section for portable appliances and portable lamps.

Paragraph (d) of Section 513-4 requires that circuits supplying pendants or portable devices be provided with polarized connection devices with the identified grounded conductor connected to the identified terminal of such devices and to the screw shell of lampholders as well as an equipment grounding conductor for non-current-carrying metal parts of lighting fixtures and portable appliances.

Other equipment

Equipment which is installed above the hazardous areas in hangars is required by Section 513-5 to be of the totally enclosed type or be provided with suitable guards or screens in order to prevent the escape of sparks or hot particles.

This includes such equipment as lamps and lampholders, switches, receptacles, cutouts, generators, charging panels, motors, and similar equipment which has make or break contacts, sliding contacts, or which may produce arcs, sparks, or hot particles.

This is required for all equipment which is less than ten feet above aircraft wings and engine enclosures.

Rules governing such equipment which is placed or installed at a minimum height of ten feet above

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Code test questions

1. Aircraft hangars as defined by the Code include areas where aircraft fuel tanks have been drained and purged of fuel. True or false?

2. The area within five feet horizontally of an aircraft structure and extending upward from the floor to a point five feet above the upper surfaces of the wings and engine enclosures is classified as a Class I, Division 2 location. True or false?

3. Brass sockets are permitted in the non-hazardous areas above an aircraft hangar for fixed incandescent lighting if a screen is provided to prevent any sparks or hot particles from falling to the hangar floor below. True or false?

4. Receptacles and attachment caps installed in a stanchion, rostrum, or dock which is not likely to be used in a hazardous area are required to be of the locking type which will not break apart readily. True or false?

5. Aircraft energizers should be equipped with automatic controls to isolate the ground power unit electrically from the aircraft in case excessive voltage is generated by the ground power unit. True or false?

6. Where a gasoline dispensing pump is not mounted on an elevated island:

(a) it is not referred to as an island by the Code.

(b) it is referred to as an island by the Code which reference includes also an area extending 18 inches horizontally in all directions from the outer edges of the pump.

(c) it is referred to by the Code only as a Class I, Division 2 location.

Which is correct? a? b? or c?

7. The hazardous area of a gasoline dispensing island extends upward to a height of:

(a) four feet above the driveway level.

(b) four feet above the elevated island.

(c) 18 inches above the elevated island.

Which is correct? a? b? or c?

8. The area containing electrical wiring within and under a gasoline dispensing island is classified as:

(a) a Class I, Division 1 location.

(b) a Class I, Division 2 location.

(c) an area beneath but not in the hazardous location.

Which is correct? a? b? or c?

9. Each circuit leading to or through a gasoline dispensing island is required to be provided with:

(a) an overcurrent device in each conductor including, where used, the grounded neutral conductor.

(b) a specially designed circuit breaker which has an overcurrent device in each conductor including, where used, the neutral conductor.

(c) a switch or other acceptable means to disconnect simultaneously from the source of supply all conductors of the circuit including the grounded neutral, if any.

Which is correct? a? b? or c?

10. Non-current-carrying metal parts of electrical equipment in service stations are required to be grounded:

(a) only where the potential exceeds 50 volts to ground.

(b) only where the potential exceeds 150 volts to ground.

(c) regardless of the voltage used.

Which is correct? a? b? or c?

Correct answers will be found at end of article on page 101.

such aircraft structures may be compared to the 12 feet above the floor of commercial garages which is required by Section 511-6 for such equipment. This variance is not as great or pronounced as it seems when the difference of the height in the hazardous areas of the two occupancies is taken into consideration.

The ten feet above the aircraft structures is ten feet above the upper limit of the hazardous area in a hangar. And the 12 feet above the floor of a commercial garage is 10½ feet above the upper limit of the hazardous area.

Lampholders of metal shell, fiber-lined types, such as brass sockets, are not permitted to be used for fixed incandescent lighting above the hazardous areas in aircraft hangars. Portable lamps which are to be used in the hangar are required to be approved for Class I locations. Portable appliances used in hangars are required to be approved for Class I, Division 2 locations.

Equipment which is installed in areas which are adjacent to, but which are suitably cut off from, hangar areas by walls and partitions or by elevation, such as offices and storage areas, are permitted to have general-use type equipment installed.

All electrical wiring and equipment, including lamps, which are installed on stanchions, rostrums, or docks, are required by Section 513-6 to be approved for Class I, Division 2 locations if used or if likely to be used within hazardous areas.

If mobile stanchions, rostrums, or docks are not to be used in hazardous areas, all attached wiring and equipment which is not above the 18-inch level is still required to be approved for Class I, Division 2 locations; and the stanchions are required to be provided with at least one permanently attached warning sign stating: "Warning—Keep 5 Feet Clear of Aircraft Engines and Fuel Tank Areas."

Wiring and equipment attached to such stanchions, rostrums, or docks which may be used above hazardous areas are required to comply with the rules for similar wiring and equipment which are installed on the building itself and which are above the hazardous areas.

Receptacles and attachment caps which are installed on such stanchions, rostrums, or docks are required to be of the locking type which will *not* break apart readily.

This rule in Paragraph (b) of Section 513-6 for aircraft hangars is in marked contrast with the rule in Paragraph (e) of Section 511-5 for commercial garages which requires that pendant type connectors which are installed above the hazardous areas be of the type which *will* break apart readily in any position.

Seals in raceways

Seals in raceways which are installed in aircraft hangars are required by Section 513-7 to comply with the rules of Section 501-5 for seals in Class I locations. This includes the rules for Division 1 in Paragraph (a), for Division 2 in Paragraph (b), and for both Divisions in Paragraph (c). (Actually, there are several paragraphs numbered 1, 2, 3, etc., under each of the lettered subdivisions a, b, and c.)

Section 513-7 also states, in regard to seals, "Raceways embedded in a masonry floor or buried beneath a floor shall be considered to be within the hazardous area above the floor when any connections or extensions lead into or through such area."

This same statement is made in Section 511-4 in regard to sealing in raceways in or beneath floors in commercial garages, but it is not stated in Section 515-6 in regard to sealing in such below-grade raceways in gasoline service stations.

This means for aircraft hangars (as well as for commercial garages) that raceways which are in or beneath the floor and thereby in a Class I, Division 1 location by the provisions of Section 513-3 are not required to have seals where they emerge from the floor if they emerge in a non-hazardous area.

One wonders in this case (and in the case of commercial garages) what happened to the requirements in Section 501-5 for seals where raceways enter and leave the hazardous areas; for a raceway passes into, through, and out of a Class I, Division 1 area when it goes underground in a non-hazardous area, passes through a Class I, Division 1 location, such as the area beneath an aircraft hangar floor, and then emerges again in a non-hazardous area.

Gasoline can enter that part of the raceway which is in the hazardous location, and fumes can emerge into the non-hazardous area where arcing devices are permitted; or sparks and hot particles from such devices can enter the raceway.

Yet, by the provisions of Section 513-7 (and Section 511-4 for commercial garages), raceways are to be considered in hazardous areas for sealing requirements only if they emerge from the floor into an area which is also hazardous above the floor.

Section 513-9 prohibits the installation of battery chargers and their control equipment in hazardous areas. A mobile charger is required to be provided with a permanent sign warning that it must be kept five feet clear of aircraft engines and fuel tank areas.

Mobile aircraft energizers and mobile aircraft servicing equipment are required by Sections 513-10 and 513-11 to have all electrical wiring and equipment located not less than 18 inches above the floor level. Such mobile auxiliaries are required to carry the standard warning sign that they be kept at least five feet from aircraft engines and fuel tank areas.

Aircraft energizers are recommended to have polarized external power connectors and automatic controls with which to electrically isolate the station power unit from the aircraft in the event of overvoltage on the station, or ground, unit. Flexible cords on all mobile aircraft servicing auxiliaries are required to be of the extra-hard usage type and contain an equipment grounding conductor.

Receptacle outlets and attachment caps are required to be of the grounding type and approved for the location in which they are installed. It is recommended that equipment which is not approved for Class I, Division 2 locations be not operated in areas where hazardous vapors are likely to be released by maintenance operations.

All non-current-carrying metal parts of electrical equipment, regardless of the voltage and whether fixed or portable, and all metallic raceways which are used in or above the hazardous areas of aircraft hangars are required by Section 513-12 to be effectively grounded in accordance with the applicable provisions of Article 250.

Gasoline stations

Gasoline dispensing and service stations are governed by Article 514. The first paragraph of Section 514-1 states, "This classifica-

tion shall include locations where gasoline or other volatile flammable liquids or liquified flammable gases are transferred to the fuel tanks (including auxiliary fuel tanks) of self-propelled vehicles. Dispensing islands are areas elevated above surrounding surfaces and on which are mounted dispensing pumps or other dispensing devices.

Where an individual pump or dispensing device is not mounted on an elevated island, an area extending 18 inches in all directions from the base of the pump or device shall be considered to be a dispensing island."

The 18-inch dimension mentioned here should not be confused with the 18-inch height above grade mentioned later in connection with hazardous areas. The 18-inch area mentioned in this paragraph means only that a pump plus an 18-inch border on all sides of the pump is to be considered an island when the pump is *not* installed on an elevated pedestal.

When the pump *is* installed on such an elevated pedestal, the pump or pumps and the elevated pedestal, taken together, constitute the island regardless of how wide or how narrow the pedestal is. See Figure 1.

The second paragraph of Section 514-1 will be skipped just for the moment and then returned to and discussed later in connection with Section 514-4.

Two Division 1 locations

There are two locations in a service station which are classified by Section 514-2 (a) and (b) as Class I, Division 1 locations. These are as follows:

(1) A dispensing island extending from the driveway finished grade level (not from the top of the pedestal where pedestals are used) but from the driveway level up to a point four feet above the driveway level (not four feet above the pedestal where pedestals are used). (2) Any area which is below grade of either a Class I, Division 1 location or a Class I, Division 2 location.

In other words, if an area *above* grade is either Class I, Division 1 or Class I, Division 2, then the same area is Class I, Division 1 below grade, and any portion of a wiring system which is below grade in such areas is required to comply with Class I, Division 1 rules.

Class I, Division 1 rules are required to be followed also, of course, for the wiring and equipment on the island up to four feet above the driveway level.

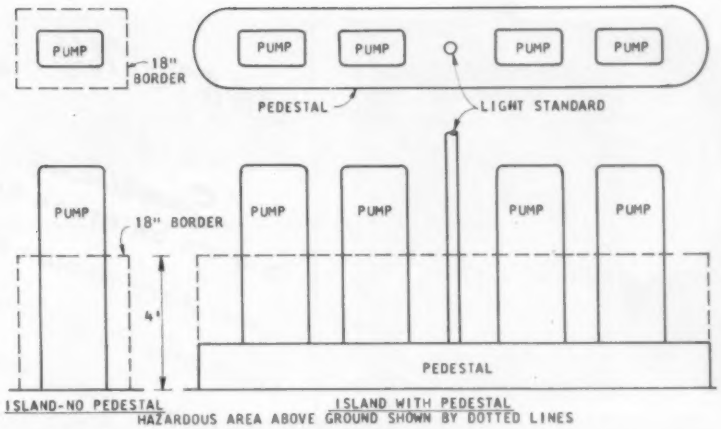


Fig. 1—Class I, Division 1 includes all of the island up to four feet above driveway level. The island includes pedestal and everything on it. Where there is no pedestal, the island includes the pump and an 18-inch border all around it. Below grade is also Class I, Division 1.

Division 2 locations

Section 514-2(b) classifies as Class I, Division 2 locations all areas which are within a 20-foot radius of a gasoline dispensing island, a gasoline fill pipe, or a gasoline vent pipe. This classification includes all such areas up to a level 18 inches above the finished grade.

Paragraph (b) of Section 514-2 states that this classification is intended for outside locations but that it includes any buildings which are not suitably cut off.

When an island is installed indoors, as is sometimes the case, especially in parking garages, inspection authorities usually rule that the Class I, Division 2 area extends up to 18 inches above grade throughout the entire indoor area which is not suitably cut off instead of just to a 20-foot radius.

If the indoor location is a parking garage or any other type of commercial garage, this extension of the Division 2 area would be mandatory by the provisions of Section 511-2 of the Code.

It will be noted that the hazardous area extends upward to a point only 18 inches above the finished grade in the area of a gasoline vent pipe, even though the vent may be just above a flat roof which is surrounded by a parapet wall. In such cases as this, inspection authorities are justified in ruling that the roof area is also a hazardous location.

This ruling can be based on the last sentence of Section 510-2 which states, "Where unusual conditions exist in a specific occupancy, the Code enforcing authority shall judge with respect to the application of specific rules." Many inspectors feel that the specific rules concerning such vents should be revised in respect to the stated limits of the hazardous boundaries.

Wiring and equipment

All wiring and equipment in the hazardous areas of service stations are required by Section 514-3 to comply with the applicable provisions of Article 501 for Class I, Divisions 1 and 2 locations.

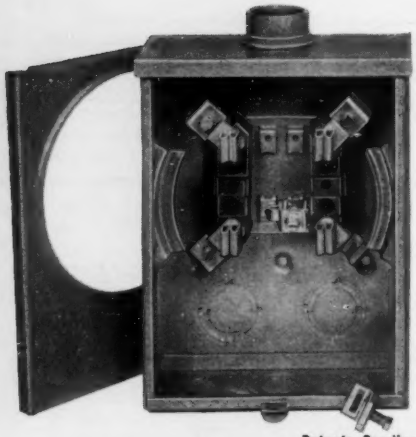
Such wiring and equipment which are installed in the non-hazardous areas are *literally* required by Section 514-4 to comply with the same rules as those which apply to areas *above* the hazardous locations in commercial garages.

However, this is not the intent of Section 514-4. This variance between wording and intent results from cumbersome English usage only.

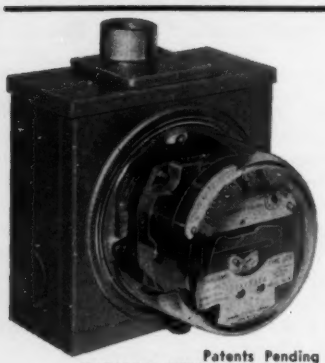
And now in connection with this we go back to the previously skipped second paragraph of Section 514-1 which states, "Other areas used as lubritoriums, service rooms and repair rooms, and offices, salesrooms, compressor rooms and similar locations shall conform to Article 511 with respect to electrical wiring and equipment."

Now if only Article 511 did state what type of wiring and equipment is required in non-hazardous

(Continued on page 100)



Patents Pending
CATALOG SL-AL-100FH-1 1/4"
Size 10 1/2" x 8" x 3 5/8"
4 Terminals—100 to 120 Ampere
Aluminum Extruded Connectors



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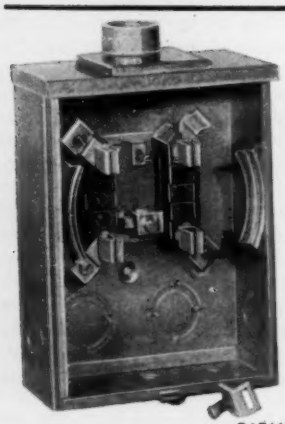
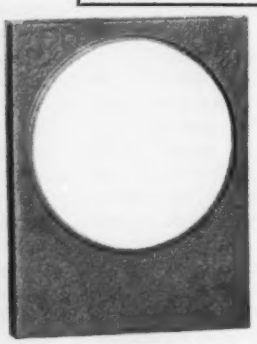
4 Terminals—100 to 140 Ampere
Standard Copper Connectors





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Size 10 1/2" x 8" x 3 5/8"
4 Terminals—100 to 120 Ampere
Aluminum Extruded Connectors

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LIGHT DUTY, MEDIUM DUTY, HEAVY DUTY SOCKETS
SINGLEPHASE, POLYPHASE, COMBINATION DEVICES
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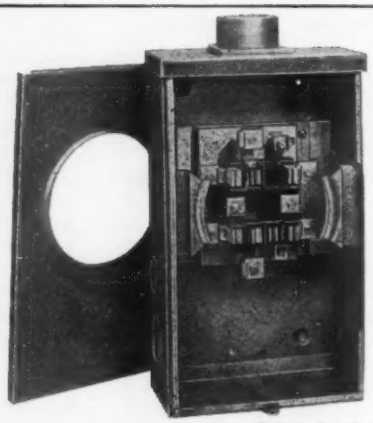

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Size 17" x 10" x 5 1/2"
7 Terminals—150 to 200 Ampere
Aluminum Extruded Connectors

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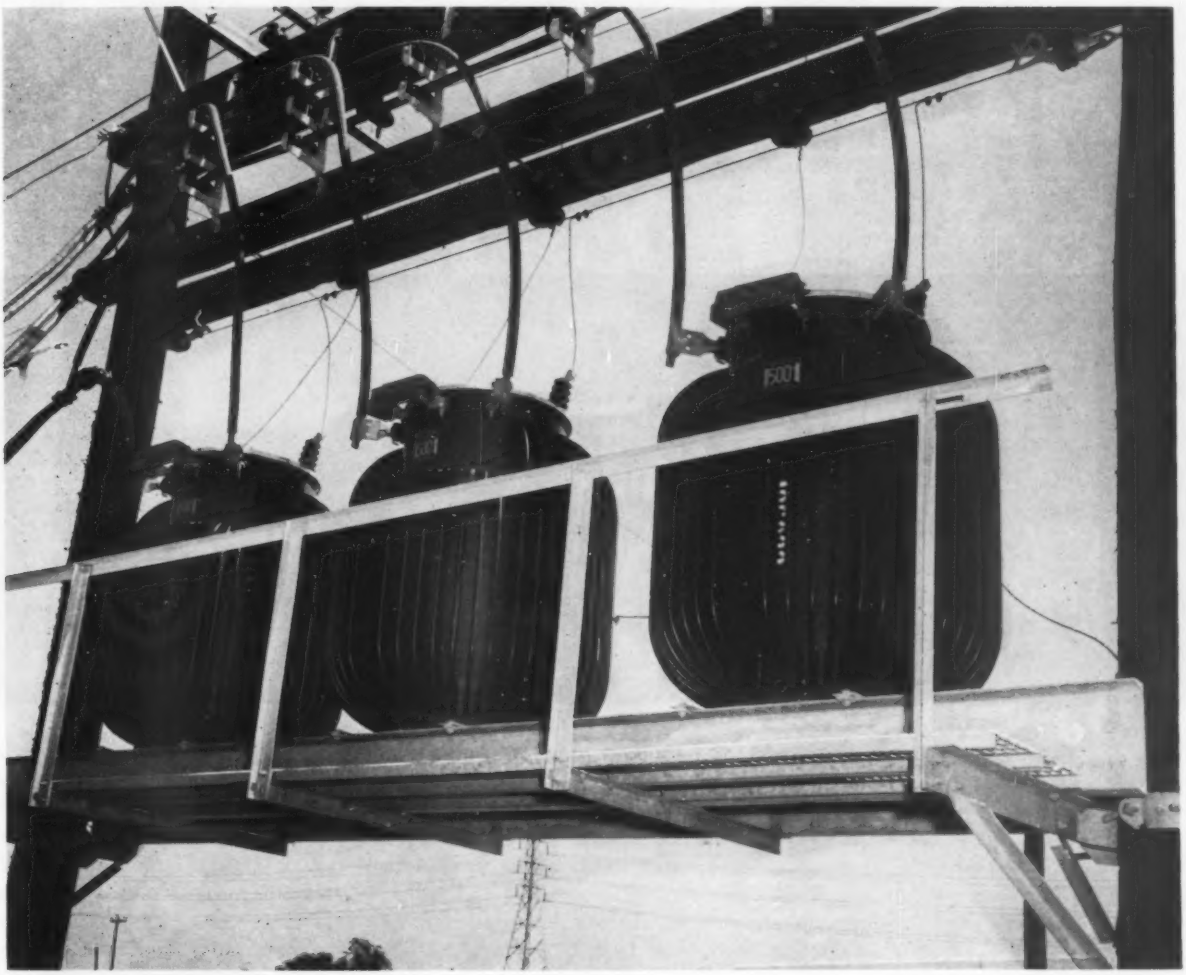
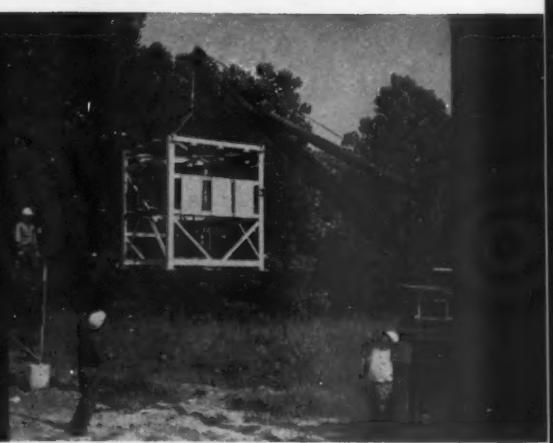


Transformer rack, serving loads of 500 to 1,500 kva, replaces ground type substation—page 65

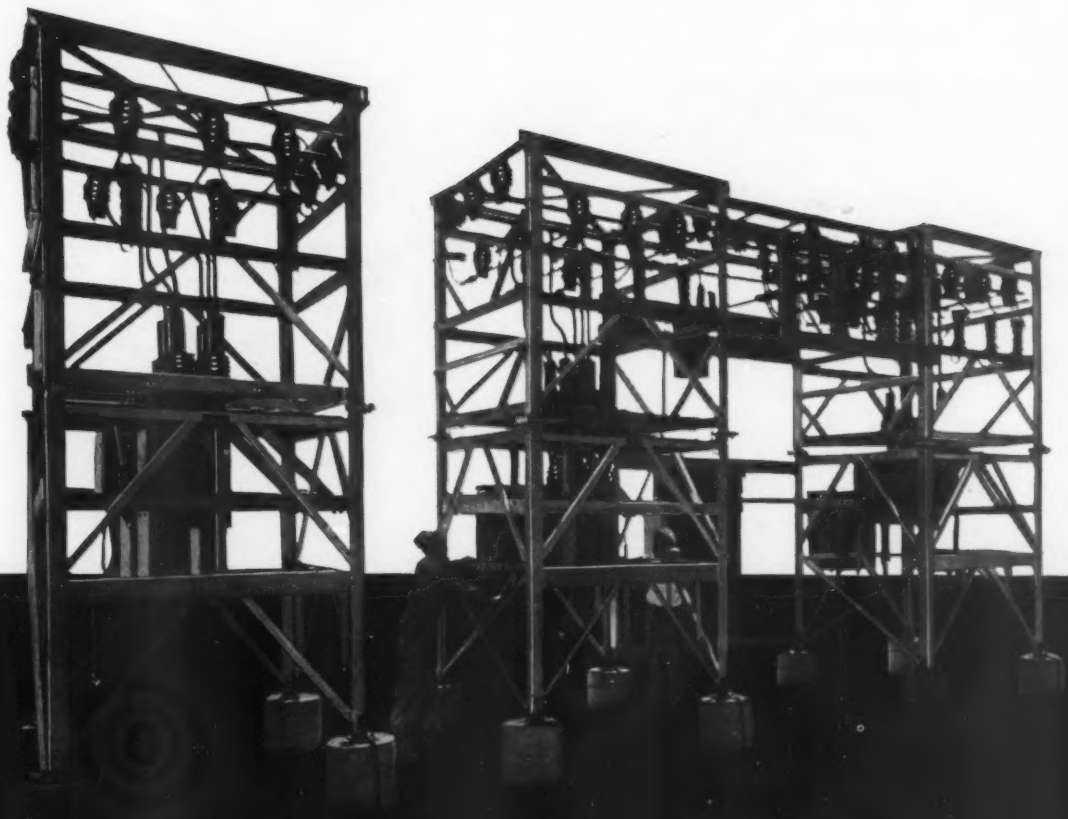
Voltage control system utilizes time clock—page 58
Three-phase power centers eliminate fences—page 61
IBM equipment estimates job costs—page 62
Automatic system transfers loads—page 66
Yoke-suspended bucket gives more working range—page 67
Trailer-mounted transformers meet emergencies—page 67
Automatic voltage regulator cuts investment—page 68

"We saved in equipment cost and erection time with these new PR Recloser Aluminum Feeder Structures"

Mr. Chester L. Williams, District Engineer, Union Electric Company, St. Charles, Missouri



Westinghouse PR Recloser Feeder Structure being installed in Mark Twain Substation of Union Electric Company.



New Westinghouse PR Recloser Feeder Structures are shipped in two sections as a complete package for the low voltage side of a 15 kv distribution substation. The cost is about 25% less than conventional methods of using other types of equipment, fabricating steel structures, assembling and wiring associated equipment and bus work. Installation requirements have been so simplified that Union Electric used a three-man crew for the job shown above. After bolting the four legs of the lower section to prepoured concrete supports, they hoisted the upper section of each recloser into place and bolted the two sections together. Elapsed time —about an hour for each recloser structure.

Each aluminum section is factory assembled and wired. You need only bolt them together then connect the transformer leads and incoming feeder leads. Each unit has dead end supports for feeder conductor, a PR recloser, lightning arresters and feeder metering equipment.

Periodic maintenance operations are simplified with the draw-out construction of the PR feeder structure. A simple tank lifter operation then lowers the recloser and disconnects the draw-out contacts—the recloser is visibly safe for maintenance.

Get more information. Call your Westinghouse Sales Engineer or write for Descriptive Bulletin 38-730. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. You can be sure . . . if it's Westinghouse.

J-65003

Westinghouse

Diagnosis: High Feed Pressure

Strongest corner-mounted derrick in the field is Holan's 7500 — a powerful, time-saving derrick that operates in an arc behind and to the right side of the truck.

Here's power . . . real power . . . all the up and down feed pressure needed to drive any derrick-suspended digger. And more than that, it's the only corner-mounted derrick built capable of handling Holan's rugged 3-speed 5400 Earth Borer.

Jobs can go ahead on schedule — even in alleys, narrow streets and congested areas because positioning problems are ended. Parked parallel to the curb, the 7500 swings over . . . even over fences and guard rails . . . reaches out . . . and digs deep holes, sets poles up to 70 feet in length.

The 7500 is engineered as a complete unit to avoid body and derrick stresses . . . can "live boom" 8,500 pounds, winch 10,000 pounds.

A semi-automatic locking device moves the earth borer onto the extendible boom for digging . . . or to its main boom storage position.

The 7500 . . . shown here mounted on the right side . . . is available mounted on the left side. It reaches up 27'-6", 18½' behind the truck, and beyond the right side 12'-3" (left-side mount) and 16'-10" (right-side mount) with boom extended.

Before you buy any corner-mounted derrick, write us — or call your Holan Field Representative — for complete details.

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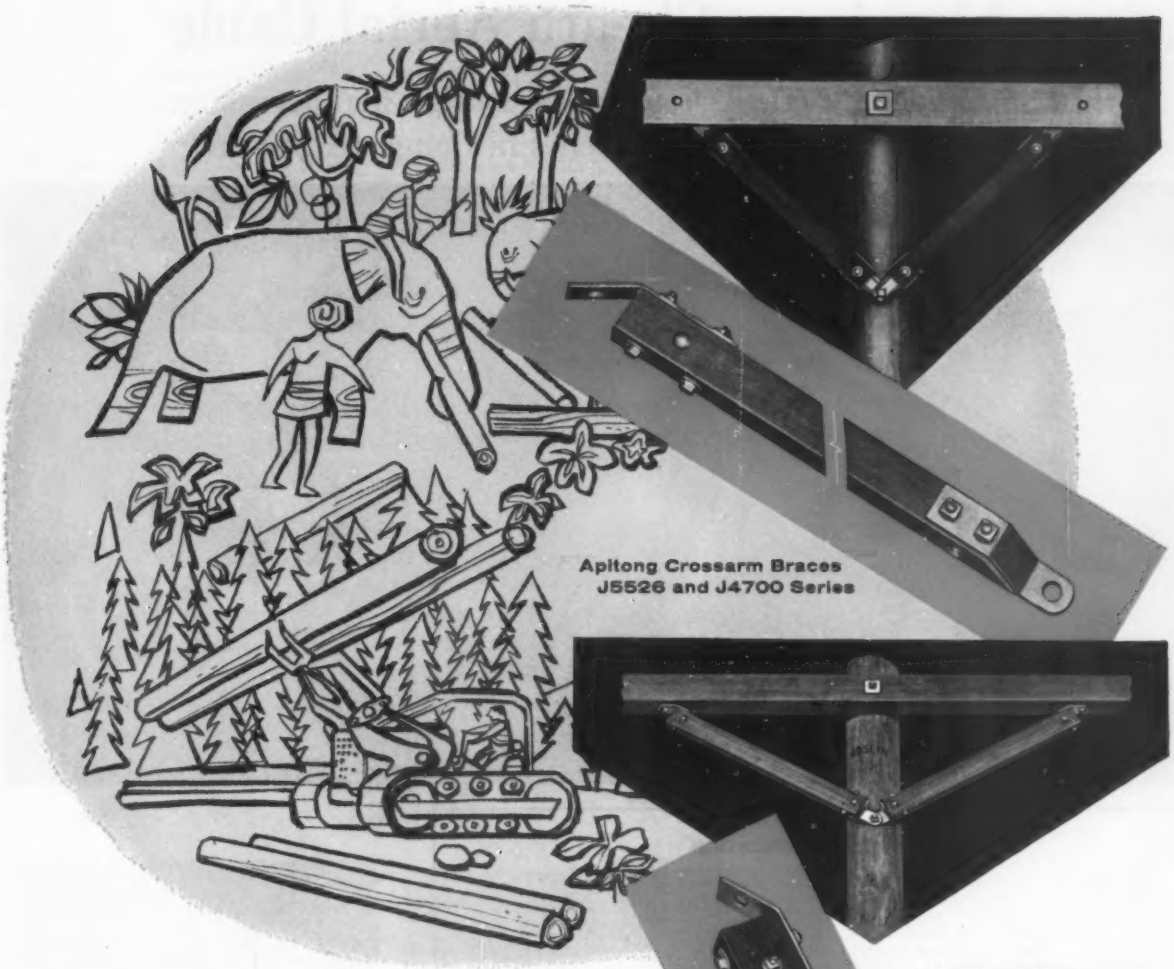
from the Pacific Northwest to Malaya to the Philippines



Apitong Crossarm Braces
J5526 and J4700 Series

Fir Crossarm Braces
J5100 and J4400 Series

The woods used in Joslyn Crossarm Braces, Douglas Fir and Apitong, have inherent physical qualities which make them ideal for this use.

To fortify these built-in characteristics, we add the magical touch of chemistry, prolonging the life-span of the wood by controlled pressure treatment with pentachlorophenol to a six-pound retention.

Wood braces increase the impulse insulation level of a structure. These Joslyn wood braces are designed with static-proof fittings — having strength where it is most needed — produced and serviced with all the facilities of the Joslyn organization.

Contact your Joslyn representative for more details on Joslyn Fir and Apitong Crossarm Braces.

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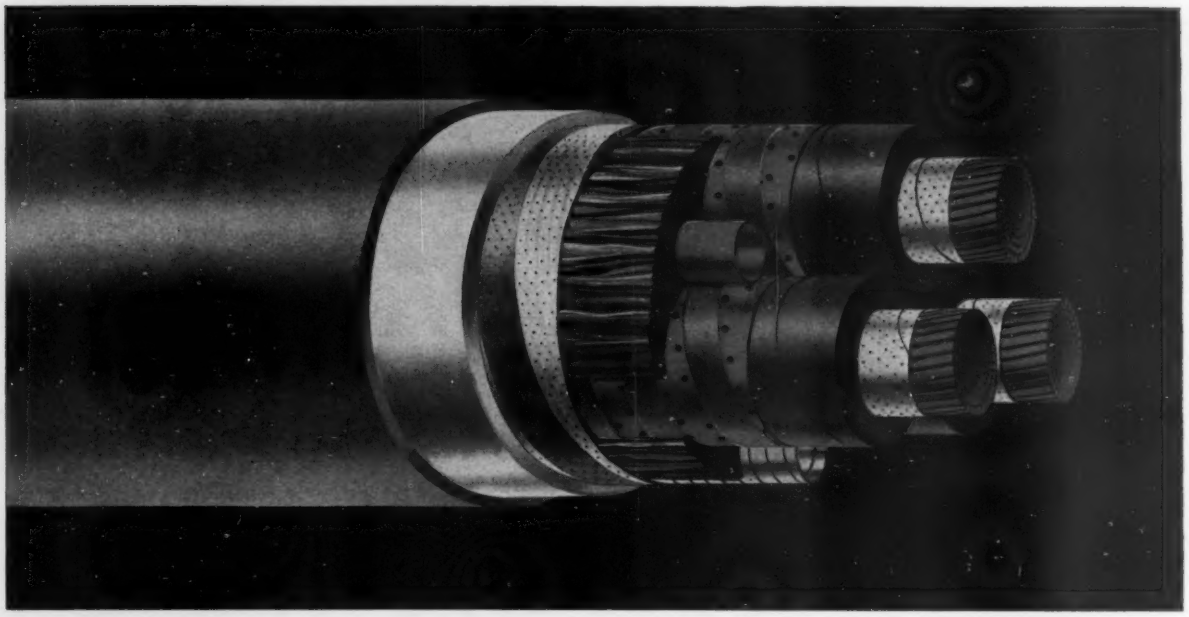
For more details on above items, use reply card on page 17

DEVELOPED BY PHELPS DODGE FOR THE ELECTRIC UTILITY INDUSTRY

New 69 KV High-Pressure, Gas-Filled Aluminum Sheath Aerial Cable

Provides Practical, Economical Design for Increasing Transmission Requirements in Congested Areas

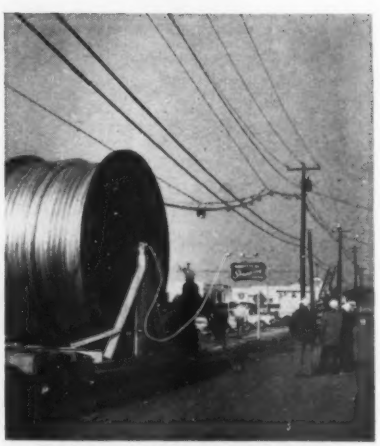


CABLE SPECIFICATION

Voltage	69 Kv.
Rating	75 MVA
Ambient air temperature	25°C
Conductor temperature, normal	75°C
emergency	90°C
Nominal shipping length	1000 ft.
Cable construction	
Three compact round conductors	800 MCM
Graded 1 to 6 mil wood pulp paper insulation	315 mils
Two steel spiral gas channels O.D.	0.760"
One copper tube gas channel O.D.	0.625"
Seamless tubular aluminum sheath	180 mils
Extruded high density polyethylene jacket	125 mils
Overall diameter	4.15 in.
Nominal operating pressure	200 psig.
Joints	Mechanical
Potheads	HPG type
Gas supply	Central Gas Cabinet

TESTING SPECIFICATION

Power factor at 90°C	below 1.0%
Ionization factor	Minimum
Sixty cycle voltage tests to ground	
Full reel	47 Kv.
Sample withstand tests,	
6 hour	107 Kv.
one minute	175 Kv.
Impulse withstand voltage test to ground (1½ x 40)	
Cable and splice	350 Kv.
Load cycle test, 60 Kv. to ground, 100°C copper	Stable



Cable was installed using aluminum blocks supplemented by periodic placement of steel blocks for mechanical strength. 69 KV cable was pulled into position from reel on trailer to messenger.

For more details on above items, use reply card on page 17

Phelps Dodge has designed and fabricated a versatile new three-conductor 69 KV aerial cable system for Long Island Lighting Co. specifically engineered for its rapidly growing suburban areas. This aluminum sheathed paper insulated high voltage power cable may be installed on distribution poles and offers the advantage of aerial cable performance at a cost substantially lower than equivalent underground cable systems. In communities with steady population and industrial growth, it meets a current need for transmitting increased electric power at high voltages where open wire systems cannot be installed.

The entire circuit includes 10,000 feet of aerially installed cable and 3000 feet of directly buried underground cable. All directly buried underground cable was provided with a high density polyethylene jacket for both mechanical and corrosion protection. Mechanical joint sleeves, developed and introduced by Phelps Dodge for use with aluminum-sheathed cable, together with installation techniques that assure dependable cable performance, were used in this LILCO project.

Other features of this advanced aerial cable are its relatively light weight and small diameter for its voltage and rating. A simple pressure control system maintains the nitrogen gas at a nominal 200-pound pressure.

The first aluminum sheathed aerial power cable installed in the United States was designed and fabricated by Phelps Dodge in 1953. Over the past years, this type cable has gained increased acceptance with utilities as an economical and practical answer to special transmission problems.

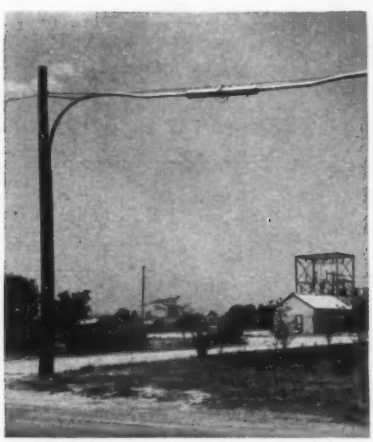
Pressurized aluminum sheathed aerial cable was first installed in this country in 1957. During that same year, design was begun on the cable system which is described here. Phelps Dodge can furnish aluminum sheathed power cable systems within a wide range of higher voltage ratings, and has designed and fabricated a 345 KV cable of this type with a capacity of 500 MVA.

For further information and engineering assistance on your particular problems, contact your local Phelps Dodge representative.

Underground portion of cable is shown in trench for direct burial. A section of underground portion was drawn thru a steel sleeve which had been driven under a heavily traveled parkway. An extruded high density polyethylene sheath was applied over aluminum sheath for mechanical and corrosion protection of underground sections.

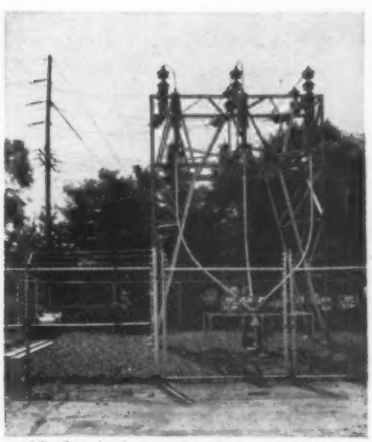
PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 Park Avenue, New York 22, N.Y.

MINE TO MARKET



Underground section of cable emerges from ground in a specially designed ventilated riser, spliced to aerial section. Note neat appearance of cable, including normal joint.

At local intersection, 69 KV cable shares poles with telephone cables, secondary and 13 KV primary. Use of aluminum sheath aerial cable overcomes objections to overhead open wire systems in communities.

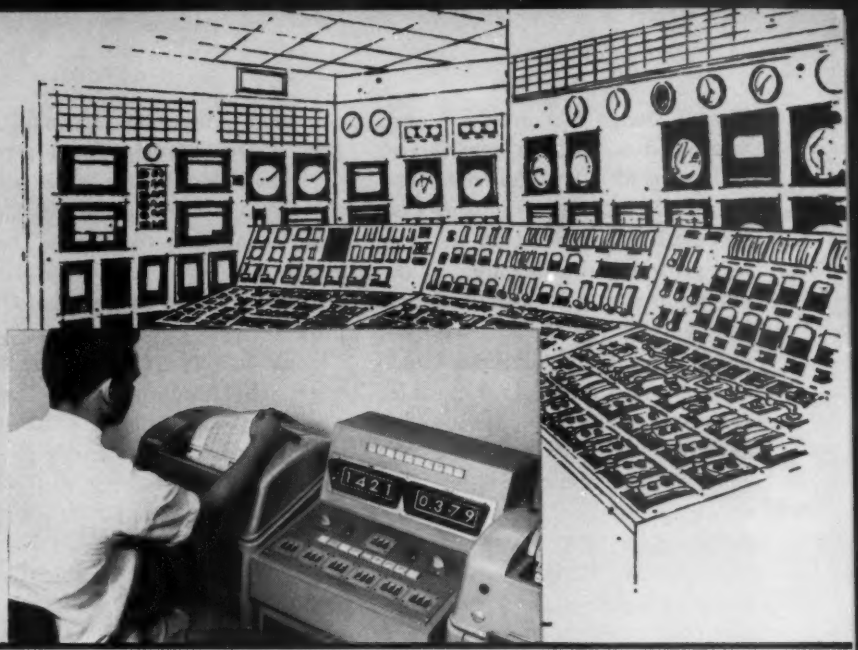


Mechanical termination assembly showing both aerial and underground terminations of cable system. Termination assembly, an above ground spreader type, is fabricated completely of aluminum.

For more details on above items, use reply card on page 17

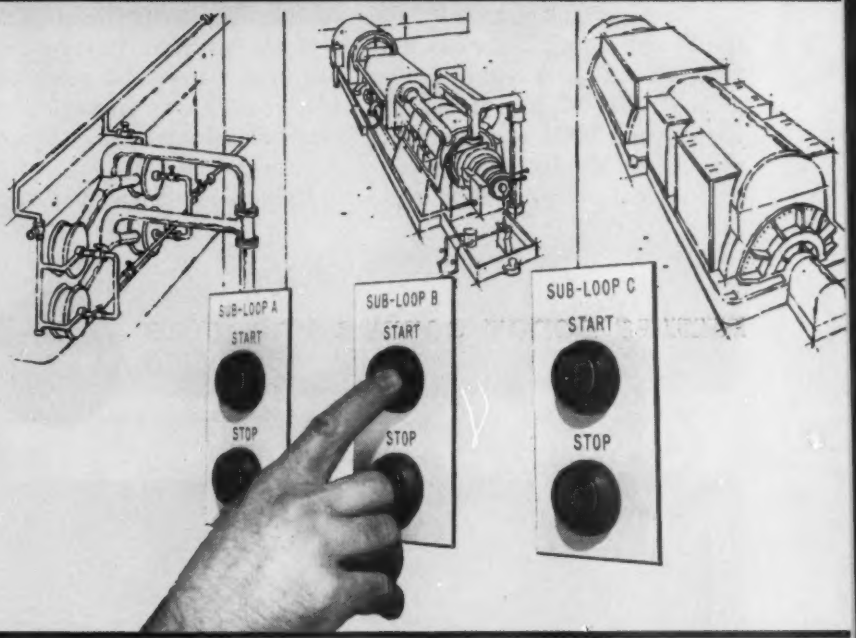
FIRST SIMPLIFY...

First step to automation is to *simplify* the information now presented by a multitude of multi-record charts, gages, and annunciator lights. The Bailey approach gives the operator data he needs (logged periodically), keeps continuous watch on all variables, makes calculations where required, alarms when trouble threatens. Reliability of recorded data is increased . . . operators can devote full attention to correcting off-normal conditions and improving operations.



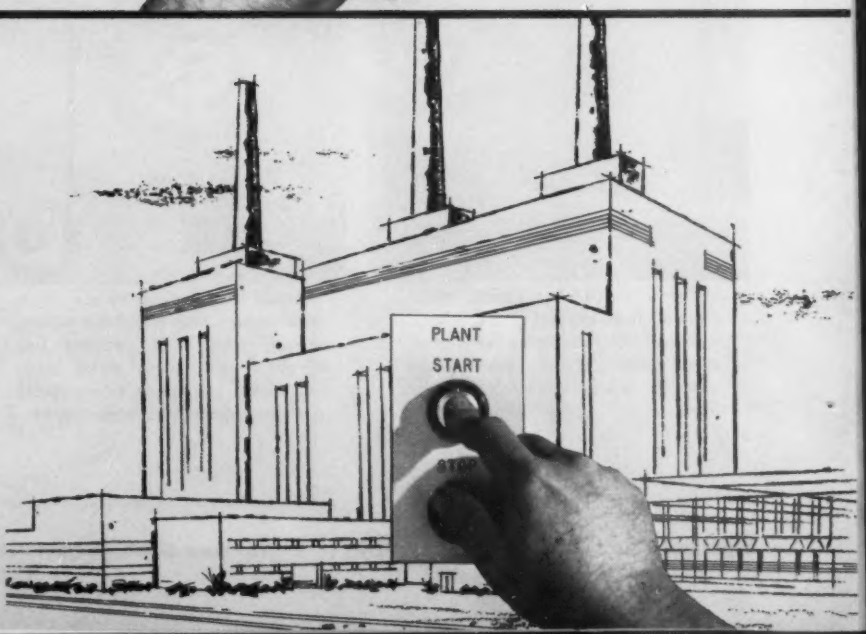
NEXT VERIFY...

Next, verify the practicability of automation by extending supervisory controls, letting equipment perform more operating functions. Automate key systems, one at a time, by push-button controlled sub-loops. This approach smooths the transition to com, lete automation and improves safety to men and machinery by providing safe, uniform start-up, shut-down, and normal operating procedures.



THEN AUTOMATE

Final steps to automation can then be made at any time with full confidence and proved operational experience. These steps are: 1) to consolidate supervisory controls, conventional controls, and sub-loops for full-range automatic operation once the plant has been placed on the line; and 2) ultimately, to add start-stop control to provide full automation.



How to get *assured results* from AUTOMATION

...and gain as you go

Complete automation is a long step forward — with many challenges along the way.

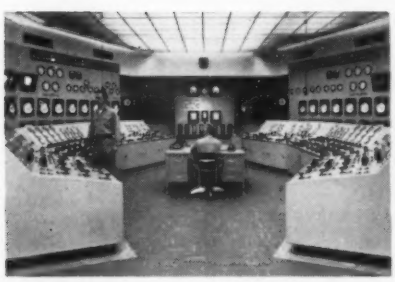
The Bailey step-by-step approach to automation makes possible step-by-step certainty ... provides step-by-step benefits ... requires only step-by-step commitment.

In the initial steps it makes possible many or most of the benefits of complete automation with considerably less investment than required for the ultimate. And it permits the decision to take each succeeding step to be made only after satisfactory evidence that it is economically justified and functionally sound.

Bailey 700 Systems draw on the best available techniques, including analog and digital manipulation, trend recording, time sharing, scanning, alarming, calculating, controlling, and logging, as required to meet operating objectives. Individual systems, including logic and sequence units, are coordinated by Bailey's distinctive method of *parallel programming* to achieve plant automation. The parallel-programming approach improves plant availability by making it practical to remove individual systems from service or reprogram without disturbing operation.

Ask your Bailey District Office, or write for more information on the Bailey step-by-step approach to automation with Bailey 700 Systems. Bailey Meter Company, 1061 Ivanhoe Road, Cleveland 10, Ohio. In Canada —Bailey Meter Company Limited, Montreal.

Bailey Systems Concepts are Founded on 45 years of Experience



Twenty-one of the twenty-six most efficient steam-electric stations in the United States use Bailey Instruments and Controls.* This reflects more than 45 years of Bailey developments devoted to improving the reliability of power-plant operation. **Listed in Federal Power Commission Report S-143.*

Bailey experience in automation dates from electrically operated boiler controls in 1924, automatic start of boiler controls on steam-electric locomotive in 1936, and fully automated package boilers in 1948. This Bailey 750 System for simplified display of power-plant operating information was installed in 1959.

Bailey experience extends to and includes the atomic power field. In the completion of the Enrico Fermi Atomic Power Plant at Monroe, Mich. in 1961, Bailey Meter Company was prime instrument contractor, supplying both pneumatic and transistorized electronic control systems. A165-2

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700 Systems

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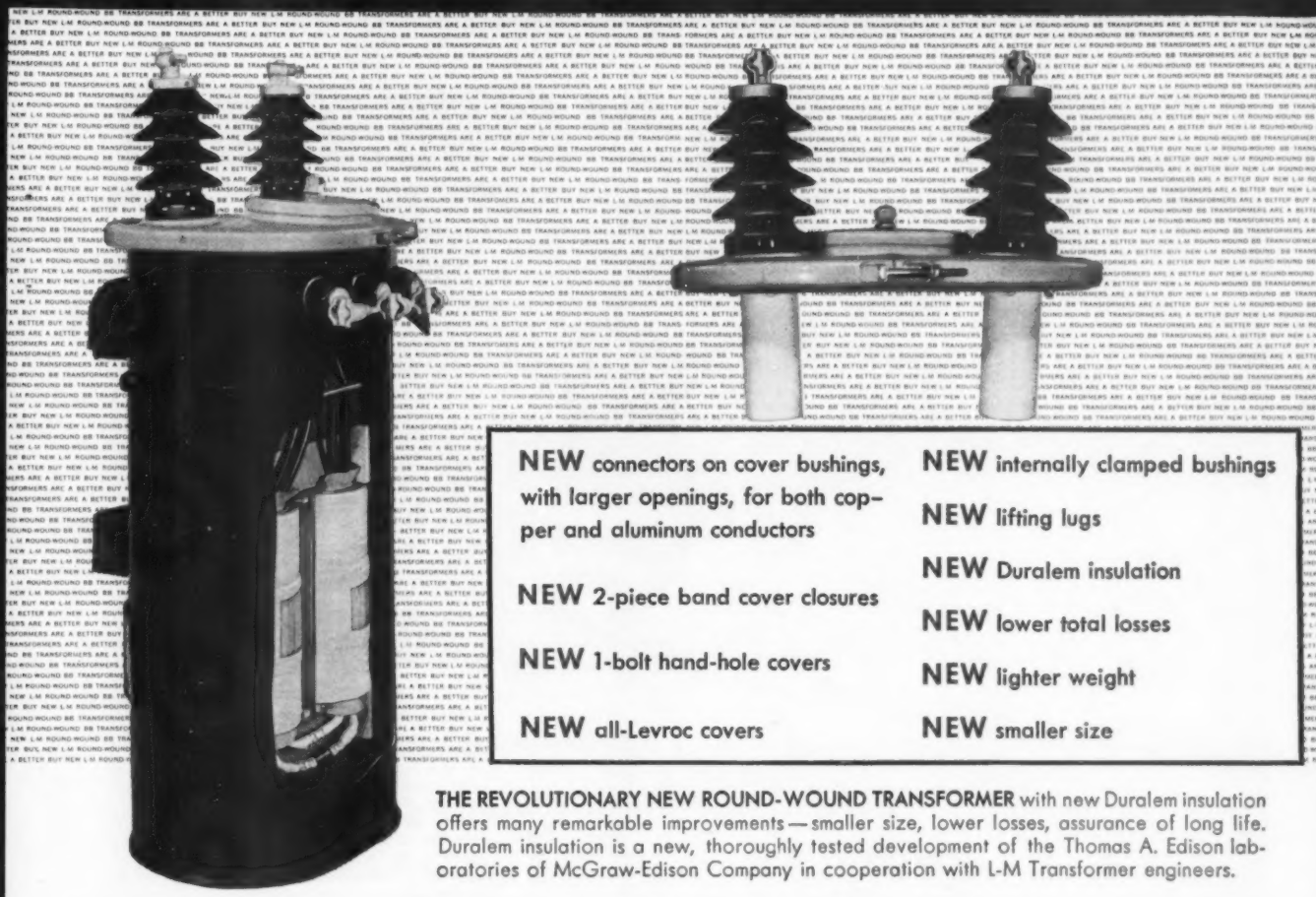

NEW connectors on cover bushings, with larger openings, for both copper and aluminum conductors

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NEW Duralem insulation

NEW lower total losses

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NEW smaller size

THE REVOLUTIONARY NEW ROUND-WOUND TRANSFORMER with new Duralem insulation offers many remarkable improvements—smaller size, lower losses, assurance of long life. Duralem insulation is a new, thoroughly tested development of the Thomas A. Edison laboratories of McGraw-Edison Company in cooperation with L-M Transformer engineers.

New Round-Wound® BB Transformer Has Duralem(tm) High-Temperature Insulation

For several years Line Material Transformer designers have been working on the development of a new Round-Wound transformer that takes even greater advantage of the exceptional cooling of the Round-Wound design.

Exceptionally Good Cooling

Because the two round coils provide greater exposure of windings to cooling oil, the Round-Wound design has always resulted in significantly lower hottest-spot temperatures, and lower average copper temperatures, thus creating the lowest temperature gradient in the industry.

As the development of Duralem insulation progressed, it became evident that the new transformer could take even greater advantage of the Round-Wound cooling system by using this newly developed high-temperature insulation.

The result of the design changes and the use of the Duralem insulation is a new transformer that is shorter (38″ high for the 25 kva, 7200 volt unit as against 45″), and appreciably lighter.

Lower Overall Losses

Losses have been reduced substantially—as much as 16% in some ratings. In addition, many improvements in mechanical features will contribute to performance, convenience, life, and ease of installation.

The new transformer will be available shortly in 10, 15, and 25 kva ratings; additional sizes will be released very soon.

Get Complete Information

Ask the L-M Field Engineer for details on this remarkable new Round-Wound BB Transformer and a copy of the AIEE paper on Duralem insulation; or write Line Material Industries, Milwaukee 1, Wis.

THE NEW L-M-EXCLUSIVE SRT transformer will also embody all the many improvements of the conventional Round-Wound transformer. Ask the L-M Field Engineer for complete information on the SRT®

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

542 Distribution Transformers

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS, SECTIONALIZERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
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DON'T LET "LINEMAN FATIGUE" ROB

Here's how the Kearney Power-operated Tool works

After correctly positioning the Kearney Power-operated Tool on the connector, the lineman squeezes a small rubber bulb conveniently attached to his belt. Air pressure from the bulb closes a switch to start a small motor-driven hydraulic pump on the ground. High-dielectric hydraulic fluid flows through a non-conducting pressure hose, advancing the ram and closing the dies to make the indent. To retract the dies, the lineman simply releases his finger pressure on the bulb.

An optional hand switch control is also available which permits an operator on the ground to control the pump on signal from the lineman making the installation.

For more details on above items, use reply card on page 17

YOU OF VALUABLE MAN-HOURS!

Kearney Power-operated Tools take the "muscle" out of compression installations, increase work output, reduce labor costs... and often pay for themselves in a month or less!

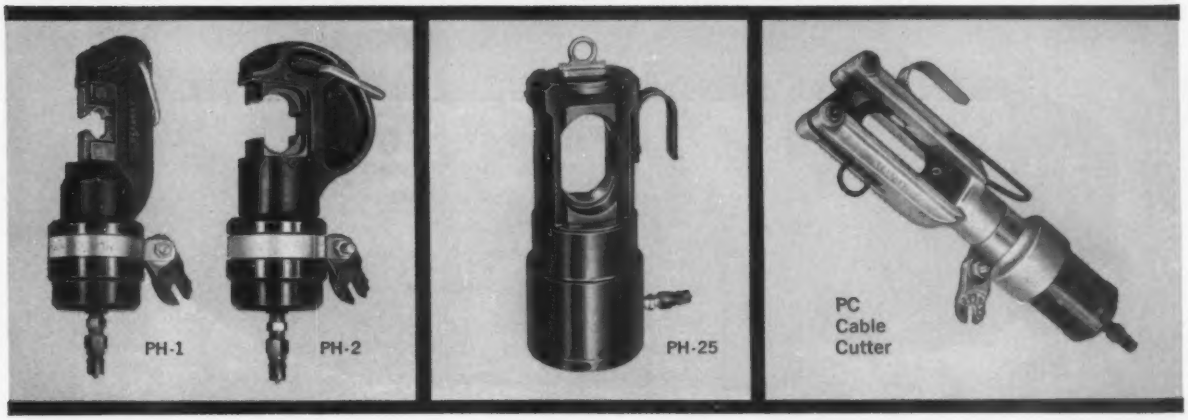
Kearney Power-operated Hydraulic Compression Tools make fast, light work of any compression fitting installation... *hot* or *cold*. By simplifying installation and reducing lineman fatigue, Kearney Power-operated Tools enable power companies to effect sizeable reductions in compression connector installation costs.

In use, the lineman merely positions the Kearney Tool on the connector and squeezes a small rubber bulb to actuate a portable motor-driven hydraulic pump on the ground below. The Kearney Power-operated Tool does the rest, without further lineman effort other than to reposition the tool for the next indent. Complete compression of the fitting can be made in less than 30% of the time ordinarily required by a lineman using the most efficient hand-operated tool.

Kearney PH-1 and PH-2 Power-operated Compression Tool Heads and the Power-operated Cable Cutter can be hotstick-mounted to make installations on energized conductor... or they can be hand-held for cold work. Using Kearney hotstick-mounted Power-operated Tools, linemen can install connectors, deadends, or sleeves... and cut ACSR or standard conductor up to 1½" in diameter... at *any* angle... with greater speed... at greater distances from the pole... and with greater safety when working on energized lines ... than has ever before been possible with hand-operated tools.

An investment in Kearney Power-operated Hydraulic Compression Tools will quickly pay for itself in labor savings and increased work output. A demonstration will convince you.

Three Tool Heads and a Powerful Cutter Head, interchangeable in seconds without tools, offer unlimited versatility



The Kearney PH-1 and PH-2 power-operated indenting heads shown above use the same dies as Kearney WH-1 and WH-2 hand-operated hydraulic tools... differ only in their maximum working ranges. For instance, the PH-1 Tool accommodates a range of aluminum Squeezon compression connectors for wire sizes up to a maximum of 4/0 ACSR or strand, while the PH-2 installs Squeezons on conductors as large as 397.5 ACSR or 400 strand. Dies may be easily inserted or removed without tools.

The Kearney PH-25 Tool Head installs a full range of compression fittings, from the smallest Squeezon up to a maximum of 1,192.5 MCM. With this tool a wide variety of fittings can be compressed with half the number of indents normally required using other types of tools. Tool develops 21 tons of thrust. Cutting dies are available for use with the PH-25 to cut conductor up to 1,500 MCM.

The Kearney Power-operated Cable Cutter cuts any type of conductor up to 1½" diameter, in 30 seconds or less. Saves many valuable man-hours otherwise lost in hand-sawing. Produces a clean-edged cut... saves deburring. Cutter may be hand-held for cold operation or hotstick-mounted for use on energized lines. Cable cutter and PH-1 or PH-2 Tool Heads can be interchanged in seconds. Cutter can also be used to cut ground rods, guy wires and like materials... on the ground... or on the pole.

For complete information contact your Kearney Sales Representative

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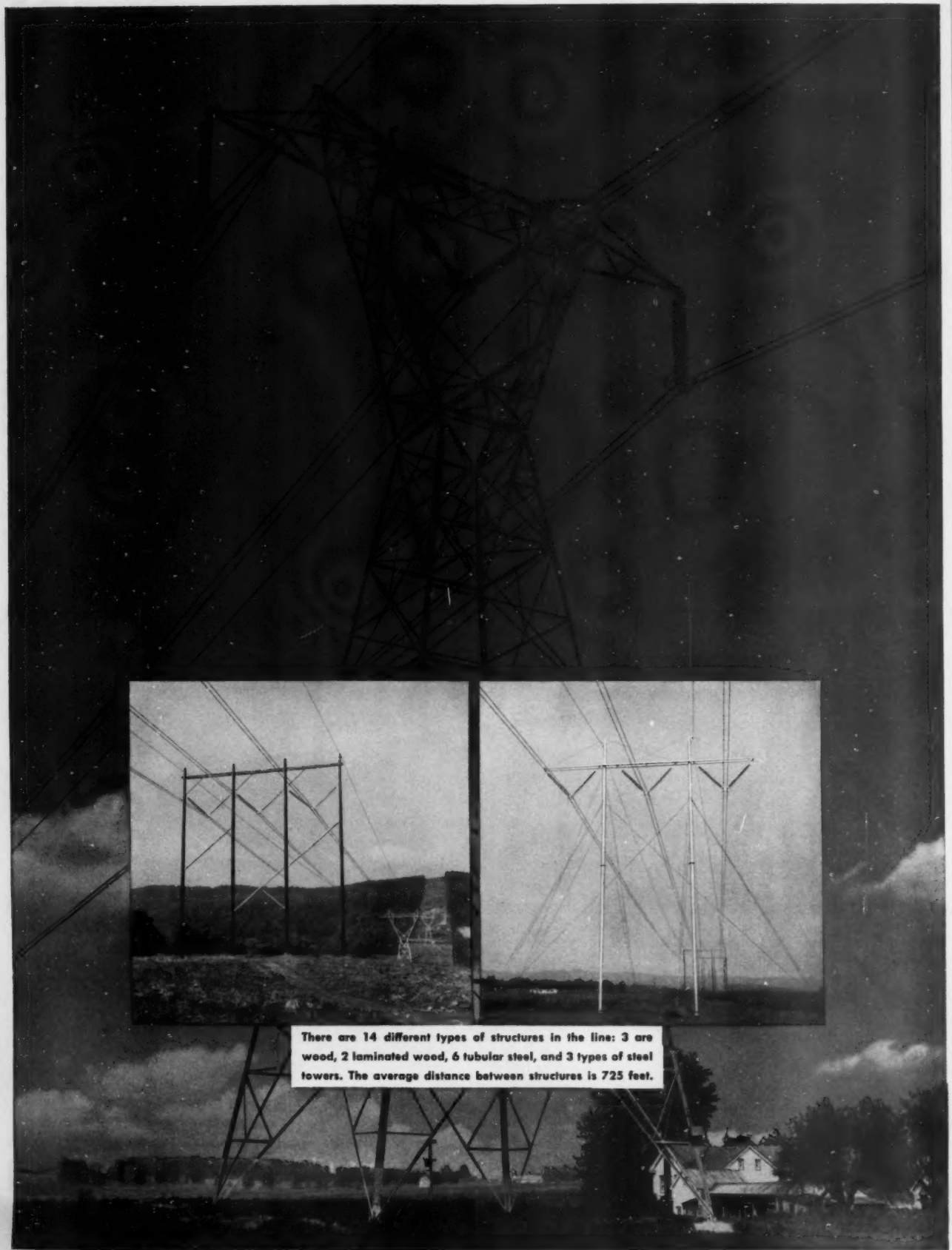


There are 14 different types of structures in the line: 3 are wood, 2 laminated wood, 6 tubular steel, and 3 types of steel towers. The average distance between structures is 725 feet.

AMERICA'S "BIG-VOLT" LINE protected by ALUMOWELD OVERHEAD GROUND WIRE

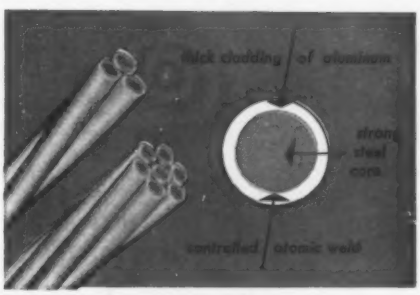
Like the famed "Big Inch" in the oil industry, Pennsylvania Electric Company's "Big Volt," its new 460-KV transmission line, represents a bold step forward in supplying the growing energy needs of America.

To protect the highest voltage operational line in America from lightning and transient currents, Penelec is using Alumoweld Overhead Ground Wire. This dependable, low-cost shield wire has three times the electrical conductance of steel, is just as strong and weighs 18% less. It has the same long life as solid aluminum.

Alumoweld is the result of the first successful cladding of a *thick* layer of pure aluminum over a high-strength steel core. The concentric aluminum covering comprises 25% of the cross-sectional area of each wire. Its high strength-to-weight ratio—higher than any other overhead ground wire—permits stringing with greater mid-span clearance to provide maximum lightning protection. Alumoweld's excellent conductivity assures reliable operation of protective relays and effectively discharges transient currents to ground.

Order Alumoweld Overhead Ground Wire and get Low-Cost, Long-Life Protection for your transmission lines.

For more complete Alumoweld data send for Engineering Bulletin E.D. 3000.



A seven-strand Alumoweld Overhead Ground Wire (7 No. 6 Awg wires), approximately ½-inch in diameter with a breaking strength of over 22,700 pounds, is used to protect the highest voltage transmission line in America.

ALUMOWELD®

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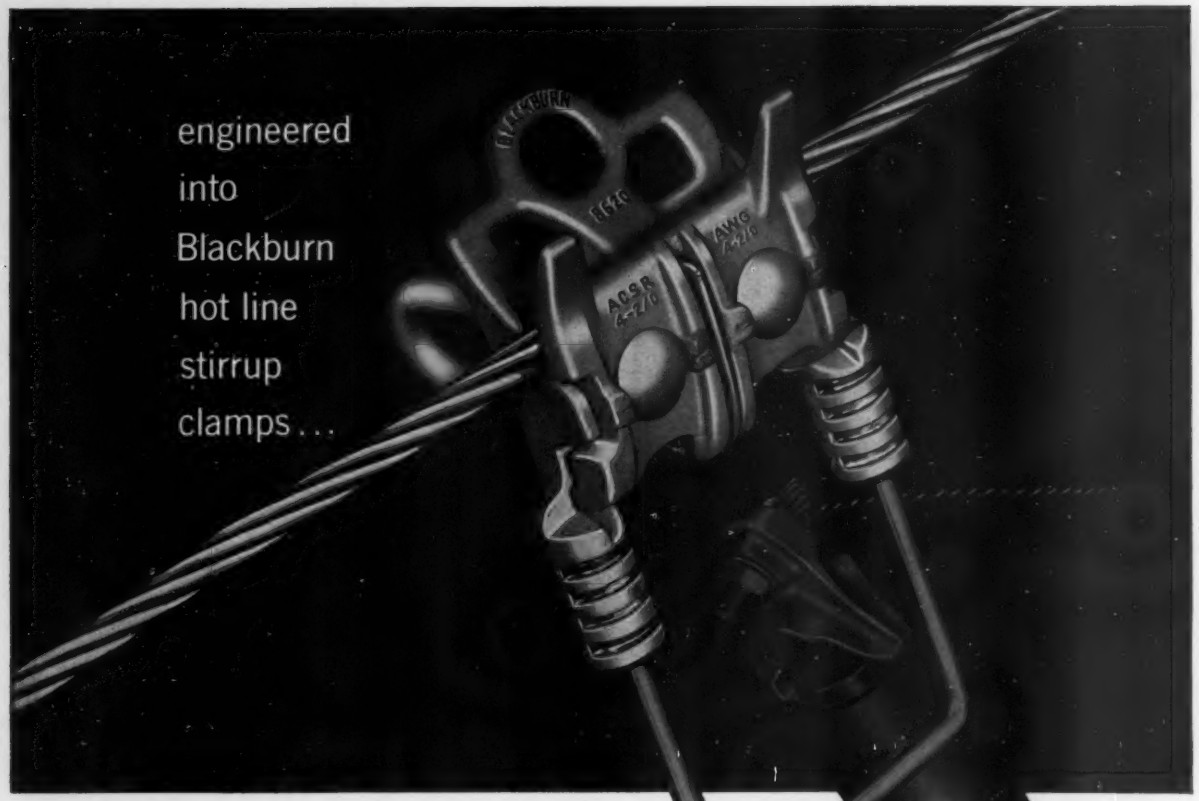

patent applied for

PROTECTION AGAINST MAIN LINE DAMAGE

Blackburn SC series clamps offer an effective way to protect main conductors against damage from hot line taps without the use of armor rod. Tap is made on extended bail . . . not on the main conductor.

High clamping force of massive clamp is maintained over large contact area, making a low resistance, cool operating main line connection. A low resistance, balanced current path is fed to the bail from both legs of the clamp. The bail is mechanically bonded to the clamp body with interlocked tubular compression sealed joints.

Castings are of high strength, non-copper bearing aluminum alloy. Clamps may be used on either aluminum or copper mains. When used on copper it is necessary to order prefilled with Contax, a highly efficient inhibiting paste. Bails are provided in bare copper, tin plated copper or aluminum. All bails are available straight or with a 45° offset.

Blackburn stirrup clamps are easily installed hot or cold. Hex nuts or eye nuts (that fit all shotgun sticks) are available. A permanent steel spring secured to the body of the clamp imparts a strong snap grip on the interlocking jaws, supporting the clamp on the main while bolts are being tightened. Only two clamps cover a main wire range from No. 4 AWG through 397.5 ACSR.

For complete information, write for catalog data sheet and samples.

Jasper
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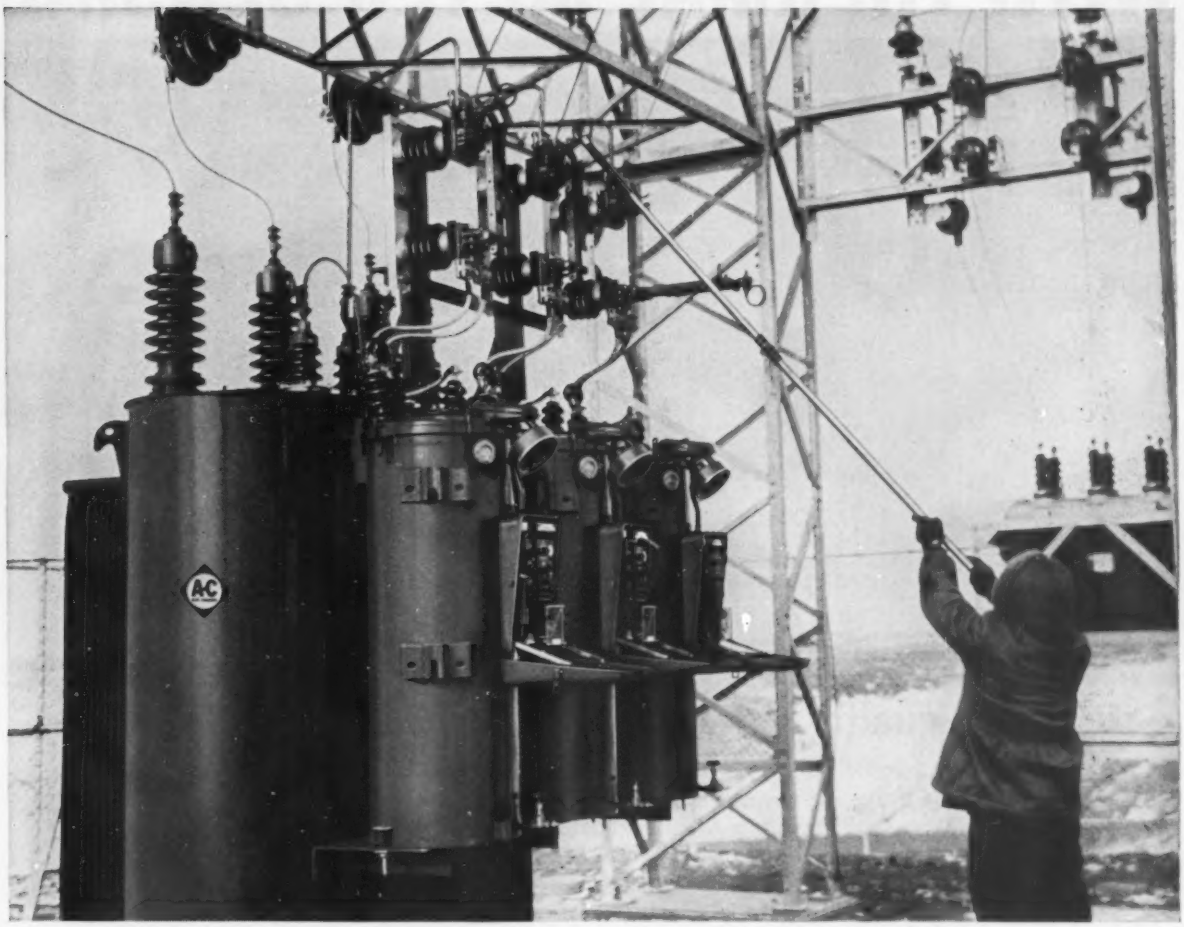
ALLIS-CHALMERS



Now! Safe by-pass of regulation equipment

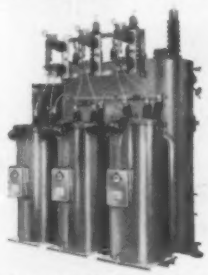
No service interruption with new Regu/Tran units

Hook-stick-operated for maximum personnel safety . . . all by-pass switch operations are performed in proper sequence. All three switches are fully visible from a single vantage point. Each by-pass switch opens both leads to the series windings . . . interrupts exciting current . . . *without interrupting the load.* Locks securely — eliminates any danger of accidentally dropping load.

These versatile switches are just one example of *Regu/Tran* unit flexibility. This unique, integral assembly offers true independent phase regulation. The three single-phase regulators improve voltage control, increase revenue. It's the economical answer to the problem of unbalanced loads and varying lengths of single-phase feeders.

- **MINIMUM INVESTMENT**—Buy Regu/Tran transformer first. Add regulators, by-pass switches as you need them.
- **TAILORED REGULATION** — If just ±5% regulation is needed, that's all you purchase. No need to pay for unused voltage range.
- **VERSATILITY** — Use transformer or regulators as separate units.

More Regu/Tran *unit facts? Call your nearby A-C office or write* **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*



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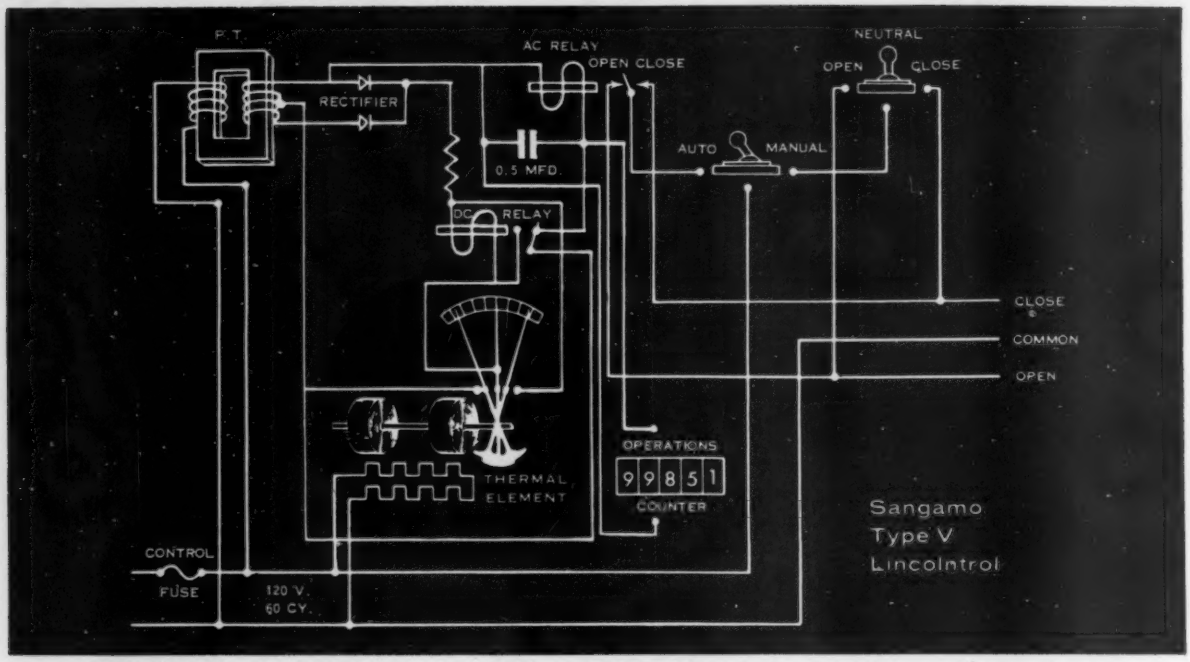
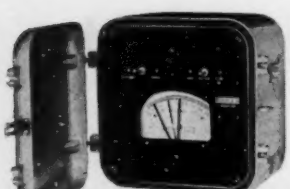
GET BETTER CAPACITOR CONTROL WITH THERMAL METER SENSING



Use high-quality low-cost Sangamo Capacitor Controls

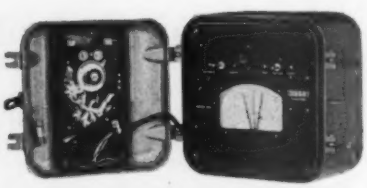
Here is the circuitry of the voltage sensitive Sangamo Type V Lincolntrol . . . one of the instruments that make up the industry's most complete line of power capacitor controls. Switch capacitors as a function of voltage, current, watts, vars, temperature, time. Switch capacitors on the basis of a combination of these functions, or switch in sequence. Switch surely, automatically, any way you choose . . . to provide the greatest benefit for your system. Write for bulletin 1142.



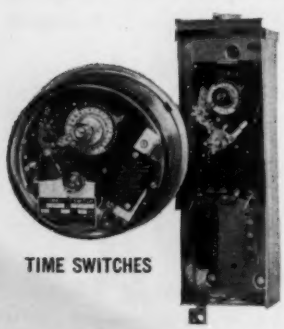
SANGAMO LINCOLNTROL

THE SANGAMO LINCOLNTROL, with its thermal meter signal relay element, inherent time-lag characteristic, and calibrated scale, is ideal for automatic switching based on an electrical quantity (volts, amps, watts, vars).

SANGAMO COMBINATION CONTROLS let you switch on the basis of time-temperature, voltage-time, voltage-current; any number of combinations for specific requirements.



COMBINATION CONTROLS

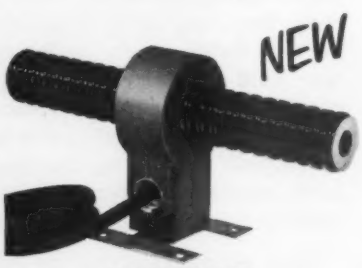


TIME SWITCHES

SANGAMO TIME SWITCHES provide automatic switching on predetermined time schedules. Synchronous carryover, omitting devices and other features make them extremely useful.

NEW . . . HIGH VOLTAGE CT

Great partner for your capacitor controls: the Sangamo V-150 High Voltage Current Transformer that combines 15 kv capabilities with low cost and 2% accuracy. Available with 200:5 and 100:5 ratios.



HIGH VOLTAGE CT

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

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ALLIS-CHALMERS

"Originators of 5/8% Step Regulators"

A-1499

All hands point to user benefits as

A-C Regulators Offer DOLLAR Savings!

SAVE DOLLARS — with a turn of the snap-action *Vari-Amp* position indicator knob. Left hand adjusts regulation limits, permits higher regulator currents. Buy a smaller Allis-Chalmers unit to provide tailored regulation or continue to use existing Allis-Chalmers regulators as load current increases.

SAVE DOLLARS — Right hand indicates *Caliband* test rheostat which will cut control setting time for reduced operating cost — increase accuracy for greater revenue. And exclusive *Caliband* test rheostat works without disturbing system voltage; without requiring adjustment of line-drop compensator controls.

SAVE DOLLARS — with position indicator drag hand electrically resettable from control panel. Remote mounting of control allows *one* man to operate both control and drag hand reset from ground — pole climbing not required; saves on poles. And you can record tap range, check feeder operation, plan changes to boost dollar return.

Call, wire or write your nearby **Allis-Chalmers** office for ALL the JFR regulator DOLLAR-SAVING facts!

Vari-Amp and *Caliband* are Allis-Chalmers trademarks.

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Voltage control system of LP&L

A control program must encompass many elements of voltage

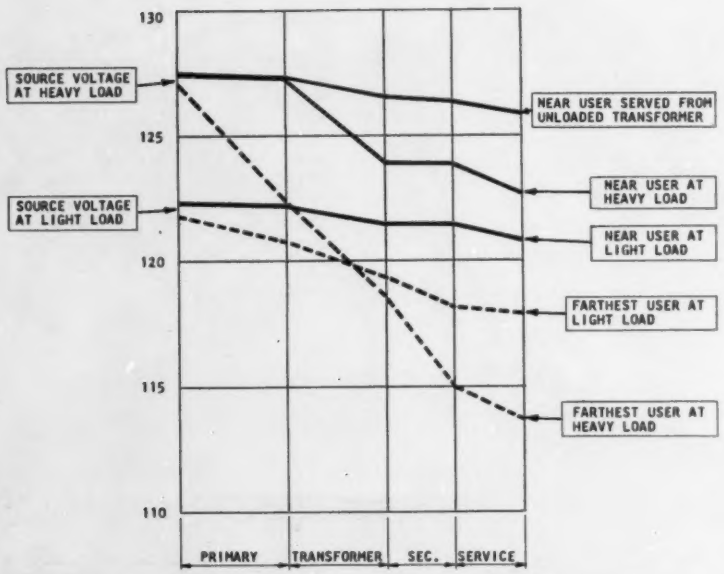


Fig. 1—The lines illustrate the range of voltage required at the regulated source necessary to maintain optimum voltage throughout as well as resulting voltage at the nearest and farthest users under heavy and light load conditions, within service policy requirements.

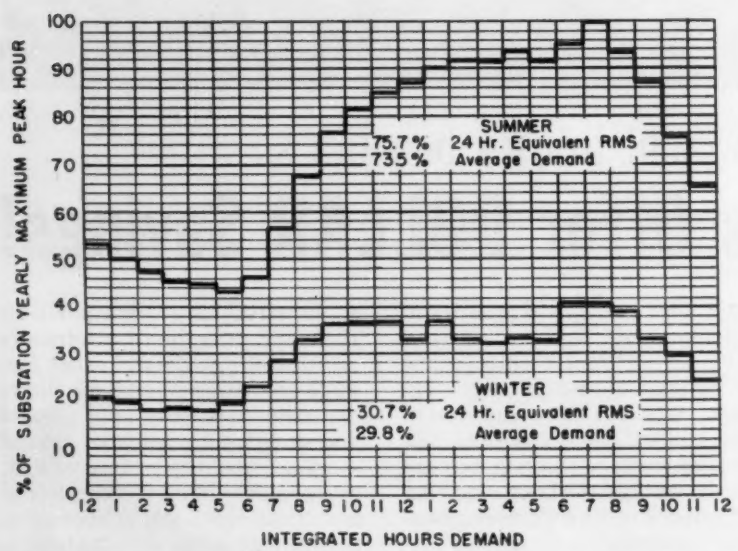


Fig. 2—Hourly demands for average summer and winter days are plotted in per cent of area maximum peak hour load at Louisiana Power & Light's Labarre 115/13.8-kv substation, which serves a typical combination commercial and residential urban area in the utility's system.

By H. L. Deloney, Assistant Chief Engineer, and R. M. Ziegler, Division Field Engineer, Louisiana Power & Light Co.

◆ The primary objective in system voltage control is the rendering of satisfactory voltage to the consumer, whose modern appliances have limitations which are much more severe than were encountered prior to the advent of television, fluorescent lights, etc.

The results have been a tightening up on allowable voltage regulation.

Louisiana Power & Light Company's present specifications require that voltage to any one customer should not vary more than five per cent, nor should there be more than ten per cent difference in voltage between any two customers served at the same nominal voltage. Applying the specified limits would mean that any one customer's voltage should not vary more than six volts (five per cent of 120 volts), nor should voltage be below 114 volts or above 126 volts to any customer (ten per cent of 120 volts, using 120 volts as nominal).

These limits are comparable to present recommendations by the National Electrical Manufacturer's Association and the Edison Electric Institute. When such limits are practiced, customer complaints are few and appliance operation is generally satisfactory.

In order to deliver satisfactory voltage to the consumer, it is necessary that the voltage control program contemplate and encompass many elements of voltage variables. These consist of generator terminal voltage, step-up transformer, transmission lines, substation step-down transformer, distribution primary circuits, distribution transformers, distribution secondary, customer's service drop, and drop within the customer's wiring.

The Louisiana Power & Light Company system is supplied from its three major generating stations which, through approximately

features scheduling by time clock

variables in order to deliver satisfactory voltage to the consumer

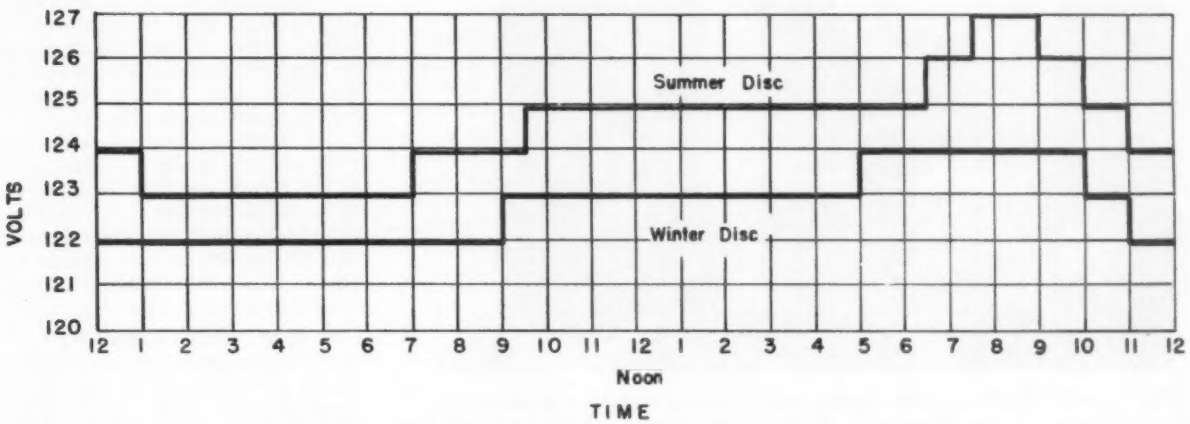


Fig. 3—The cam profile is for a regulator time control; voltage schedule satisfies summer and winter load variations. Weight is given the residential component. regulator operated with a three-step band width. This

1,375 miles of transmission lines, interconnect at 23 points to the balance of the Middle South System and other neighboring utilities. Connected to the transmission network are 66 substations which supply the 13,000 miles of distribution lines serving 246,500 customers.

Variable loading on the system, coupled with transfers through the system, makes it impossible to regulate distribution system voltage at the generator. Removal of this requirement from the generators allows full available generator field range and allowable voltage range to be utilized in optimizing the transmission of power and reactive from the generators to the load.

The normally dispatched voltage scheduled for a typical power plant calls for a transmission voltage level three to four per cent higher at the system daily heavy load period than is called for at the time of the system light load period.

The generator terminal may be found to vary as much as 12 to 15 per cent in order to satisfy the transmission requirements due to the voltage drop in the generator step-up transformer created by variations in kw loading and direction and magnitude of reactive flow.

The three to four per cent positive regulation injected at the plant high-voltage bus to some extent counteracts transmission and step-down distribution substation voltage drop, but it is still short of the desired positive regulation characteristic at the step-down substation bus — the degree of which depends upon system load level, transmission distances, local substation capacity, and loading, as well as power factor.

Voltage drop beyond the major step-down substations occurs in the distribution primary circuits, transformers, secondary, and customer service drops. Economic system design dictates that the various components of drop be proportioned as follows:

	Peak load 100% (Volts)	Light load 25% (Volts)
Primary feeder	4.8	1.25
Transformer (160% load)	4.0	1.0
Secondary	3.5	.9
Service	1.2	.3
Total	13.5	3.45

Figure 1 illustrates graphically the range of voltage required at the regulated source necessary to maintain optimum voltage throughout as well as resulting voltage at the nearest and farthest users under heavy and light load conditions, within the requirements of the service policy mentioned above.

It can be seen that the source voltage must be held between 122 volts at light load and 127 volts at heavy load in order to maintain a median voltage of 120 volts at the customer's premises.

In order to fulfill regulation requirements outlined above, individual three-phase regulators or tap changing underload equipment is provided for all substation transformers connected to the transmission.

This regulating equipment usually has a range of ± ten per cent—which, coupled with the ten per cent tap range of the main transformer, is adequate for taking care of the transmission voltage variations during normal and emergency conditions, the voltage drop in the step-down transformers, plus the positive regulation requirements at substation peak (positive regulation meaning higher voltage at higher load).

Compensation requirements for

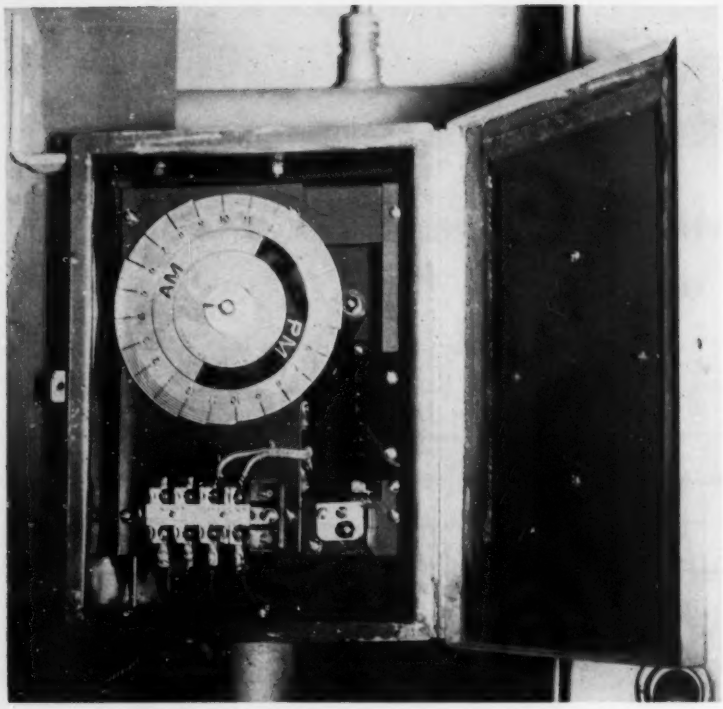


Fig. 4—Allis-Chalmers' time device is in place on a station regulator.

Fig. 5—Three consecutive poles are usually employed for each of the three installations of line type regulators on a three-phase circuit.

these bus regulators vary widely when it is considered that each substation usually consists of two or more three-phase transformers supplying a multiplicity of feeders which in turn supply a variety of classes of customers having diverse load characteristics and patterns.

The substation transformers may be operated in parallel under certain conditions, or one transformer may be called upon to carry the entire station load during outage on the other transformer or supply circuits. Therefore, there is no theoretical "load center" as is the case with individual feeder regulator applications.

These facts, coupled with the effect of seasonally switched and automatically switched capacitors, make it impractical in many instances to obtain optimum regulation of the station bus voltage by means of conventional line drop compensators.

Time clock scheduling

Having realized and experienced results of the shortcomings of conventional compensation, it was decided to explore the feasibility of time clock, bus voltage scheduling, with consideration being given to seasonal and daily load patterns. A study was made to determine an optimum schedule for the mixture of commercial, residential, and industrial loads encountered on a typical substation.

Results of this study indicated that the voltage profile should best follow the load characteristics of a typical residential feeder since maximum voltage drop is usually encountered in the elements of the distribution system from the substation to the last users in this class.

The commercial and small industrial users in general are found to be closer to the substations than are the residential users.

Further study of seasonal and daily load characteristics indicated that an acceptable compromise could be obtained by providing only two voltage schedules to represent annual and daily variations instead of the considerably larger number that had been first anticipated. It was found that the daily load shape and sun-time effects for the off-peak season (October through April) were sufficiently consistent to allow the use of a single schedule for this period. The same thing was found to be true for the on-peak season (latter part of April to first part of October.) In the first case, daily loads

range from 18 per cent to 41 per cent of annual peak and in the second case they range from 43 per cent to 100 per cent of annual peak.

Figure 2 represents an actual substation load of a typical combination commercial and residential urban area. On this chart are plotted hourly demands for typical summer and winter days in per cent of area maximum peak hour load.

Figure 3 shows the actual desired voltage schedule arrived at as being desirable to satisfy the particular summer and winter load variations described above, with particular weighting being given the residential component of the load.

A study of the various makes of regulator controls indicated that the most practical method of obtaining the desired time scheduling was to insert variable values of resistance in the coil circuit of the conventional primary voltage relay supplied with the regulator. This also has the advantage of allowing mixing of the time control and line drop compensation in various degrees if desired.

Two devices offered

Several manufacturers were invited to supply proposals on a time device for accomplishing the desired voltage scheduling and two of these companies offered acceptable designs.

Allis-Chalmers supplied a device having a synchronous clock driving a 24-hour cam, which graphically represents the actual voltage profile. Cam-operated switches insert the proper amounts of external resistance in the voltage relay coil circuit. Figure 4 is an actual photograph of this device in place on a station regulator. The face of the dial visible in the picture represents a 24-hour timing period reference, and cams cut into its periphery operate the resistance changing switches.

Moloney Electric Company supplied a more conventional, multicontact synchronous clock which switches voltage relay coil circuit resistance in a similar manner.

A large percentage of our substations supplying combination loads have been equipped with "time clock" voltage scheduling devices. Reliability of the devices has proven to be excellent and results have been gratifying. Future plans call for installations of such devices on all major stations except those supplying principally large industrial loads, in which case conventional compensation is quite adequate.

A sideline benefit of "time" voltage scheduling is the elimination of the necessity for deactivation of regulator controls during line switching, which involves temporary tying of feeders between substations.

The absence of reactance compensation in the regulator controls removes the tendency of voltage instability normally encountered, since any circulating current involved is easily absorbed in reactance drop of the looped circuits without upsetting the balance point on the effected regulators.

Feeders may be transferred back and forth between substations or between transformers within a substation without upsetting the bus voltage schedule as would normally happen in the case of conventional compensation.

Approximately 70 per cent of the load supplied on the Louisiana Power & Light Company system is located within the first two to three miles of circuit distance from the substations, since the stations are normally located near a load center. Bus regulation of the type described above usually suffices for this portion of the load.

Line re-regulation

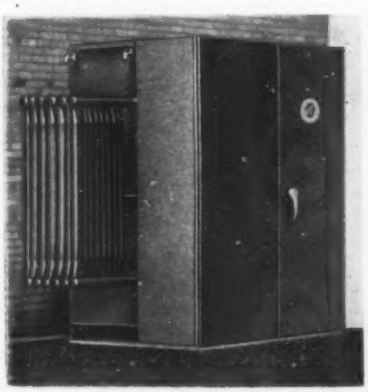
The remaining 30 per cent, however, requires re-regulation due to the cumulative primary voltage drop to loads farther out; and in extreme cases, two or three points of re-regulation are required. The advent of the modern pole type regulator furnished the distribution engineer with a very satis-

(Continued on page 99)

Line of three-phase power centers eliminates fences and overhead units

◆ A new line of three-phase power centers has been developed by Pennsylvania Transformer Div., McGraw-Edison Co., specifically for shopping centers, industrial plants, schools, and similar applications in which appearance and space may be important.

Designed for use with underground primary feeders, the new "Power Supply Centers" permit the elimination of fences and overhead structures without the expense of underground vaults. Sizes range from 750 through 2,500 kva, 15 kv and below.



The power center will be especially useful for applications at shopping centers, factories, and schools.

Standardization of features and accessories, according to Pennsylvania Transformer, has resulted in manufacturing economies that are reflected in prices now being quoted. In addition to low initial cost, long-range economies are predicted because of the elimination of normal maintenance costs for fences and overhead structures.

Pennsylvania's standard "Power Supply Center" includes a 55 C rise, oil-immersed, load-center transformer with standard load-center accessories. Terminal compartments, with hinged doors, are provided for both high- and low-voltage connections. All live parts are enclosed in the weatherproof, tamperproof compartments, which may be padlocked.

Primary cable entrance is from underground, with either top or bottom cable entrance on the secondary. A choice of colors—either transformer gray or forest green—is offered at standard prices.

Optional accessories are available, at additional cost, to meet special requirements. Included are provisions for secondary bus duct entrance, potheads, fuses, lightning arresters, and provision for the utility's metering equipment.

IBM equipment estimates job costs

Utility's engineering department has supplied the data processing machines with material costs and estimated labor costs for installing the material

By C. K. Jones, Overhead Engineer, City Public Service Board, San Antonio, Texas.

◆ The City Public Service Board's electronic data processing equipment has recently been given the job of producing estimated cost and man-hours for all construction sketches requiring a main work order.

Manufactured by International Business Machines, the equipment will also produce man-hours for small construction sketches which do not require an estimate main order, but do require a bill of materials. This is an additional procedure which has been developed in conjunction with the present procedure of detailing material for construction jobs by IBM equipment.

The engineering department has supplied the equipment with the estimated labor cost for installing unit items of pole and line material. These estimates are based on the time it requires a lineman and helper to put these items up on the job with no interference.

This labor figure is punched in a card and is regarded as the nominal labor cost. Therefore, each time the item is used the labor will also be printed and accumulated in a total labor figure, as well a total quantity figure. If this were all that would be necessary to make estimates, the problem would be simple. Unfortunately, this is not the case because field conditions and other factors make the labor costs go up.

These factors are determined by the field engineers and are shown on each sketch, along with the bill of material in accordance with account numbers. The factors we are using are limited to five at the present time. They are shown in Table I.

Items 2, 3, 4, and 5 on Table I are prorated on each job as to the amount of the material involved. All of these additional factors involved in a job are added together before they are put on the sketch. This then is the engineering factor which is used by the equipment as a multiplier. For example, if other conditions added up to 60 per cent, then the engineering factor would be 160 per cent nominal labor.

Formula used by IBM equipment:

$Q \times I \times 5.02 \times E.F.$

Where Q = Quantity
I = Installation time in man-hours for linemen and helper
5.02 = Labor cost per man-hour
E.F. = Engineering factor

The following is an explanation of factors used in Table I for poles and line work with sample jobs.

(1) Pole Work—Since only one engineering factor must be supplied the equipment for each account or special item, driving time must be calculated separately and added to the other field factors. It costs just as much labor in driving time to set one pole in an area as it does to set two or more.

Example: Three poles must be set on a job located approximately 15 miles from the service center.

Factors from Table I:

Hot line work	25%
Line crew	30%
Nominal factor	100%
Total	155%

Apply formula:

$Q \times I \times 5.02 \times E.F. =$ Labor excluding driving time

$3 \times 1.45 \times 5.02 \times 1.55 = \$33.90$ excluding driving time

Average driving time cost = $20.38

Total labor cost = $54.28

$Q \times I \times 5.02 =$ Labor factor

or $3 \times 1.45 \times 5.02 = 21.83$

$\frac{54.28}{21.83} = 2.48 =$ Engineering factor

$2.48 - 1.55 = .93 =$ Driving time factor

The table will give the factor to use for the number of poles set. Referring to Table I, the engineering factor shown for three poles is .90. This added to 1.55 gives 2.45, or the total engineering factor.

ENG. FACTOR ITEMS	TYPE OF CREW (FIELD FACTORS)					
(1) TRAVEL TIME	POLE CREW		LIGHT HVY. CREW		HEAVY CREW	
	AVG. FACTORS		1 TO 10 MI.	11 TO 20 MI.	1 TO 10 MI.	11 TO 20 MI.
1 - POLE JOBS	2.80		—	—	—	—
2 - " "	1.40		—	—	—	—
3 - " "	.90		—	—	—	—
4 - " "	.70		—	—	—	—
5 - " "	.50		—	—	—	—
6 TO 9 POLE JOBS	.40		—	—	—	—
10 TO 14 " "	.30		—	—	—	—
15 TO 19 " "	.20		—	—	—	—
20 TO 24 " "	.15		—	—	—	—
25 TO 30 " "	.10		—	—	—	—
SMALL JOBS	—		.15	.20	—	—
LARGE "	—		—	—	.10	.20
	POLE CREW		LIGHT HVY. CREW		HEAVY CREW	
	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
(2) EASEMENTS OR PRIVATE PROP.	.05	.01	.05	.01	.05	.01
(3) TRAFFIC CONDITIONS	.10	.01	.10	.01	.10	.01
(4) HOT LINE WORK	.25	.05	.25	.05	.25	.05
(5) BAD TREES	.10	.05	.10	.05	.10	.05

Table I—Five factors determined by engineers affect the labor costs.

STD NO		MAT	IN LAB	IN M H	REM LAB	REM M H	SALV
48A							
48B		82.88	30.87	6.1602	23.19	4.6194	
49A					3.22	.6414	
49B					3.22	.6414	
50A		4.76	1.29	.2574	.96	.1912	
50B		9.52	2.58	.5148	1.94	.3864	
50C		14.28	3.87	.7722	2.90	.5776	
51A					2.55	.5079	
51B					2.34	.4661	
51C					2.09	.4163	
51D					1.87	.3725	
51E					3.15	.6274	
51F					3.00	.5976	
51G					2.71	.5398	
51H					2.62	.5219	
51I		18.12	6.62	1.3276	5.00	.9960	3.56
51J		36.24	13.28	2.6552	10.00	1.9920	7.12
51K		2.59	1.09	.2230	.84	.1673	
51L					2.14	.4262	
51M		1.61	.48	.0990	.36	.0717	
51N		2.27	.93	.1901	.71	.1414	
51O					5.96	1.1872	
51P					23.27	4.6353	7.65
51Q		9.12	3.65	.7348	2.76	.5497	1.13
51R		7.51	3.15	.6358	2.38	.4740	1.13
51S	2	5.90	2.65	.5368	2.01	.4003	1.13
51T	3	4.29	2.17	.4378	1.65	.3286	1.13
51U	4	17.37	6.43	1.2944	4.86	.9681	3.04
51V	5	15.32	5.91	1.1886	4.48	.8924	2.86

Fig. 1—The IBM equipment produced this sample page from the summary listings of standards and special item costs.

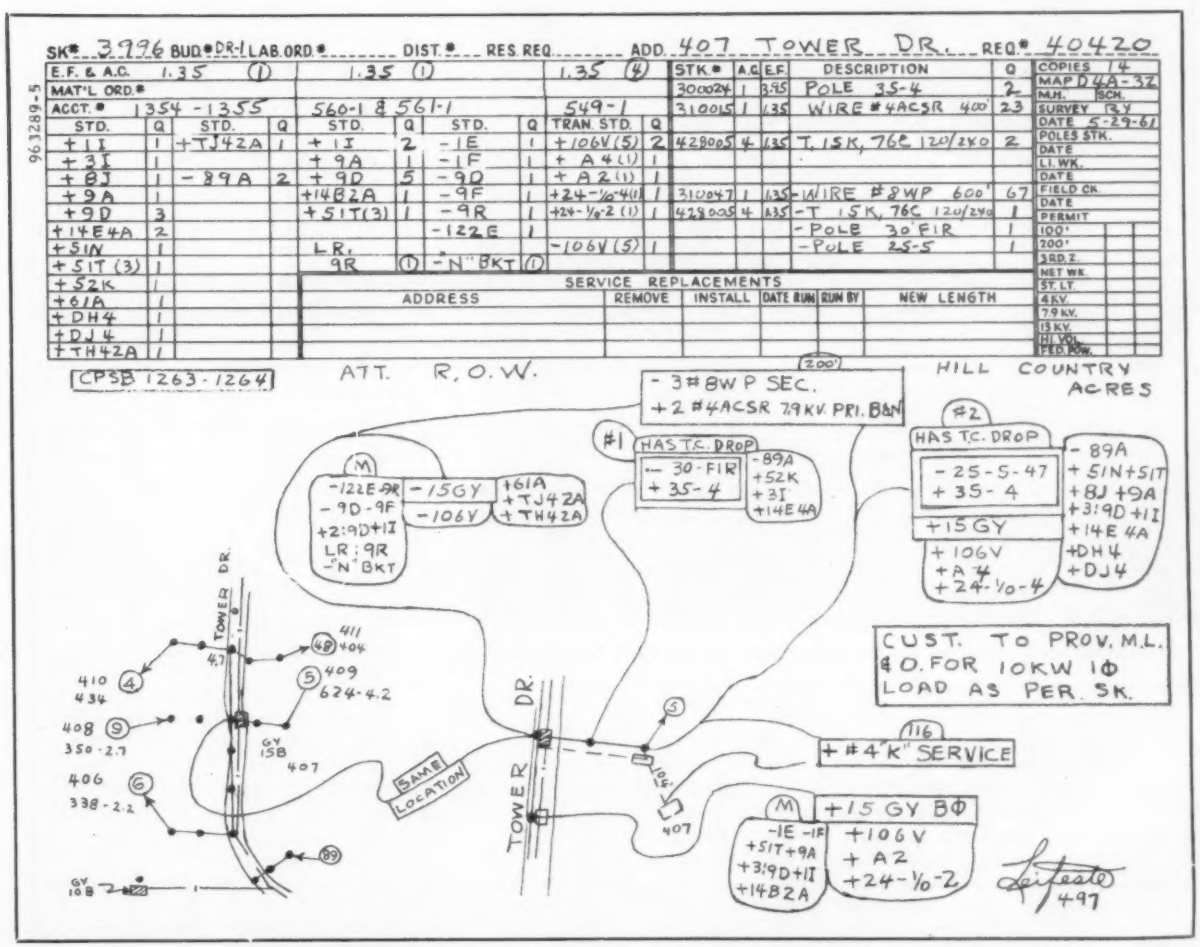


Fig. 2—The City Public Service Board uses construction sketches to calculate the materials needed for a job.

(2) Line Work—Time costs for all size jobs done by a line crew are approximately the same, varying only as to distance from the service center. The per cent to be added to the engineering factor, however, varies proportionally to the size of the job.

Therefore, for an average condition, all jobs are divided into two classifications, small jobs done by a light heavy crew and large jobs done by a heavy crew. Light heavy crew factors are based on doing two or three jobs per day. Heavy crew factors are based on jobs lasting several days or weeks.

Example: The line crew must install ten straight line 13-kv standards (standard No. 51-J, from Figure 1). All structures are involved in hot line work and are in our easements. The job is located about 20 miles from the service center.

From Table I, these factors add up to 50 per cent. The factor therefore is 100 per cent plus 50 per cent or 150 per cent. From Figure 1, I = 2.6552, for 1-51J. Apply these figures to the formula, Q x I x 5.02 x E.F.

Q = 10
I = 2.6552
E.F. = 1.50

10 × 2.6552 × 5.02 × 1.50 = $199.43 Total labor cost

Since nominal labor covers only a portion of the crew, traveling time for any job must include the whole crew in determining that portion of the engineering factor. Also since a separate crew handles all pole setting and removing, traveling time must include the whole crew time. These factors are also shown in the table for easy guidance.

Figure 1 is a sample page from our summary listings of standards and special item costs.

One of our construction sketches, No. 3996, is shown in Figure 2 with a separate detailed list of

(Continued on page 99)

963602-1

STORE ROOM	AREA	DISTRICT	VOLT. CODE
			30

ELECTRIC
REQUISITION ON STORES
DISTRIBUTION OFFICE

SKETCH NO.	MAIN ORDER NO.	LOC.
3996		

LOADING DATE	FOREMAN	TRUCK NO.	FILLED BY	CHECKED BY

MATERIAL DESCRIPTION	STOCK NO.	LOAD TOTAL	MINOR 929	MAJOR MATERIAL — CONSTRUCTION: POLE 1354	LINE 1355	1363	1359-1	MAINTENANCE: 549	550	POLE 560	LINE 561	569
ARM WOOD 2B	302016	2		1						1		
ARMS X 4 PIN L B	302004	4		3						1		
ARRESTER LTG 10KV	774000	2						2				
BRACES WOOD 2B	303004 1	4		3						1		
CUTOUT 100A 15KV	685031	2						2				
WIRE 6 CU SOL BARE	310023	8						6			2	
WIRE 6 CU WP	310048	2						2				
WIRE ALUM 1/0 POLENE	310014	10						10				

Fig. 3—From the sketch (Figure 2) the IBM equipment has produced a list of major material according to accounts.

SK. NO. 3996

ACCT. NO.	MATL. CLASS	INS. MATL. (A)	INS. LABOR (B)	TOTAL INS. (C)(A+B)	REM. LABOR (D)	TOT. INS. & REM. (E)(C+D)	INDIRECT (F)(15%E)	SALVAGE (G)	ACCT. TOT. (H)(E+F-G)	INS. M. H.	REM. M. H.
1354	POLE	57.14	53.10							3	
	OTHER	25.59	17.40							3	
	TOTAL	82.53*	70.50*	153.33*	*	*	*	*	*	6*	*
1355	WIRE	8.05	5.59							1	
	OTHER	6.45	3.32								
	TOTAL	14.50*	8.91*	23.41*	16.50*	193.24*	28.99*	*	222.23*	1*	2*
	SUB-TOTAL	97.33*	79.41*	176.74**	16.50*	195.24**	28.99*	*	222.23**	7*	2*
549	WIRE	3.50	2.24								
	OTHER	107.01	34.78							6	
	TOTAL	110.51*	37.02*	147.53*	11.49*	159.01*	23.85*	25.70*	157.16*	6*	2*
560	OTHER	13.04	13.55							2	
	TOTAL	13.04*	13.55*	26.59*	*	*	*	*	*	2*	*
561	WIRE	.88	.56								
	OTHER	1.53	.98								
	TOTAL	2.41*	1.54*	3.95*	5.00*	35.54*	5.33*	.51*	40.36*	*	1*
	SUB-TOTAL	125.96*	52.11*	178.07**	16.49*	194.55**	29.18*	26.21*	197.52**	8*	3*
	SKETCH TOTAL	223.29	131.52	354.81	32.99	387.79	58.17	26.21	419.75	15	5

Fig. 4—Finally, the electronic equipment produces a complete estimate of costs from the original sketch (Figure 2).

Overhead rack replaces ground type substation

New transformer rack will serve loads of 500 to 1,500 kva

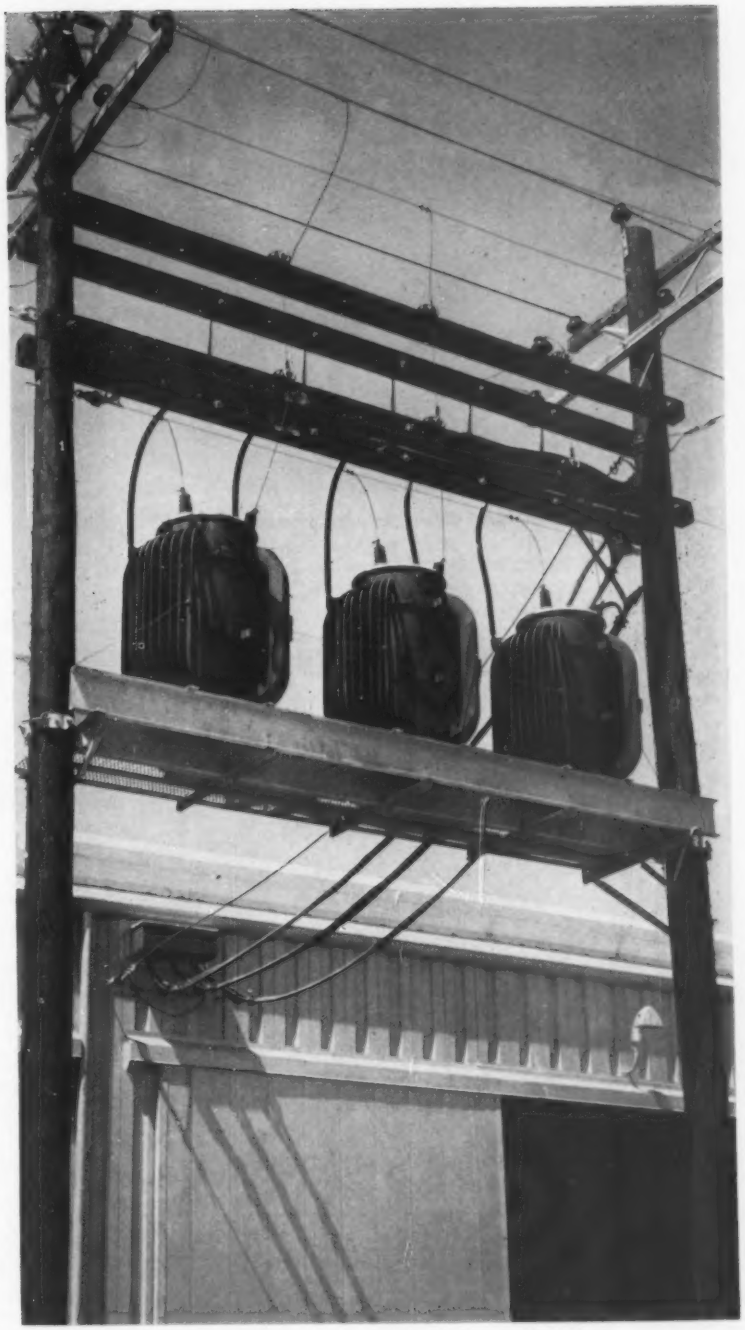
By L. R. Gardner, Supervisor of Overhead Distribution, Houston Lighting & Power Co., Houston, Texas.

◆ The Houston Lighting & Power Company has developed a new pole rack design for serving loads in the 500-1,500-kva range.

The new design, which can be used along streets and alleys or in other locations where ground space is not available for ground type substations, has the following features: (1) lightweight, 500-kva, pole-mounted transformers; (2) 18-foot, two-pole, steel transformer rack; (3) combination cutouts and lightning arresters; and (4) a continuous bus run from the transformer lugs to customer entrance.

Newly designed 500-kva pole-mounted transformers were used because of their light weight, small size, low impedance, low losses, and lower initial cost. The transformers were placed on the rack 20 feet above the ground to provide clearance for telephone company contact and to allow for parking or traffic under the rack.

The 18-foot, two-pole, steel rack will support 12,000 pounds and has a steel mesh walkway for servicing the transformers. The rack is supported by class 3 poles, and is attached to the poles by band type clamps. Bolted fittings are used to clamp the base of the transformers securely to the rack.



The 18-foot rack has a mesh walkway for servicing the transformers.

The transformer cases and supporting rack are grounded.

Use of combination 15-kv, 100-ampere, 8,000-ampere IC cutouts and nine-kv lightning arresters eliminates field connections of the lightning arresters, saves space on crossarms, and insures the arresters being near the equipment to be protected.

An accompanying installation shows that the transformer bus (parallel 1,000 MCM copper) is continuous from the secondary lugs to the customer's entrance in order to minimize the number of connections. Step type racks are used to support the cable, provide maximum phase spacing, and improve appearance. The cable is supported at the pole and building

(Continued on page 99)

Equipment is easily accessible for maintenance.

Enclosing eliminates hazards of open equipment.

Automatic system transfers loads

Austin's enclosed automatic primary switching equipment installations insure high-quality service for heavy loads near the network service area

By H. L. Peterson, Underground Distribution Engineer, Electric Dept., Austin, Texas.

◆ Growth is the lifeblood of any city, and Austin, Texas, has had its share of growth.

Location of new loads away from the downtown underground network areas has created new service problems. Quality of electrical service is of utmost importance to these new large customers.

It has been the desire of the city electrical department to provide service to these customers equivalent to that provided within the network area.

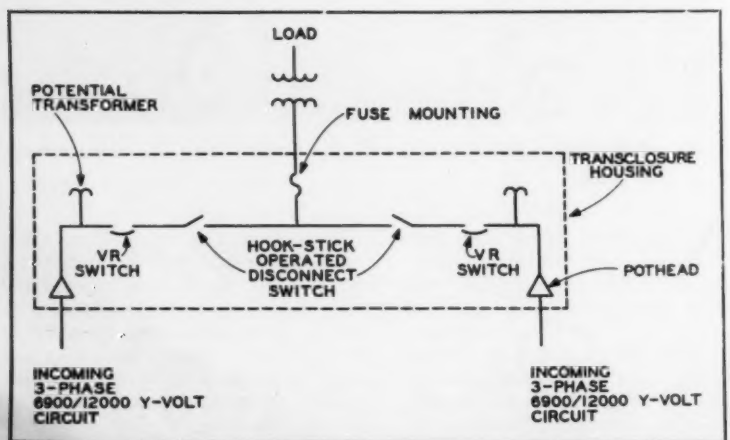


Fig. 1—The equipment switches two 6,900/12,000-volt feeders.

In the past, dual primary feeders were provided to important loads adjacent to the network service area. Manual primary transfer equipment installed in basements of hospitals, large apartment buildings, and commercial businesses was used to switch loads to alternate power sources.

Automatic primary switching was not used in previous installations because of equipment limitations and cost.

Austin has recently made two installations with automatic primary switching equipment. The equipment is used to switch two 6,900/12,000-volt, wye-connected radial feeders that serve the load directly from two power plant busses. The circuit capacity is 5,000 kva and the approximate available fault current is 12,000 amperes.

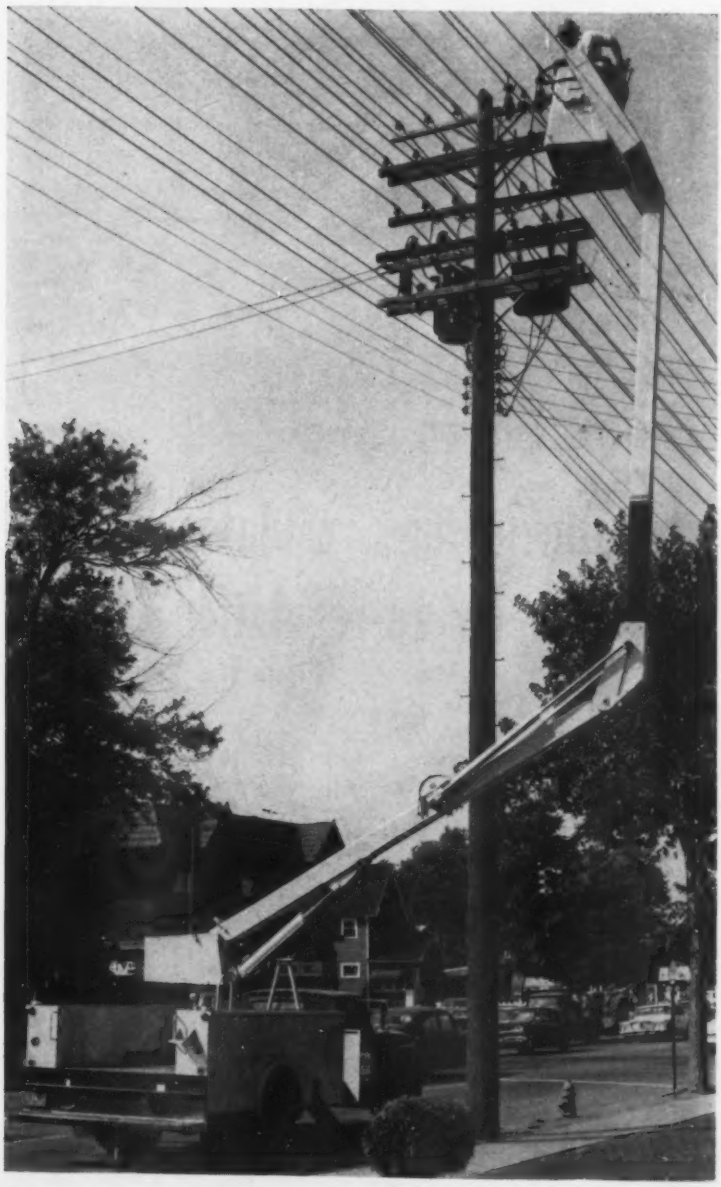
This equipment consists of two 14.4-kv, 400-ampere, type VR Line Material three-phase oil switches enclosed in a Line Material Transclosure housing. Enclosing this equipment in a metal housing reduces the vault area required and

(Continued on page 98)

Yoke-suspended bucket gives elbow 30 per cent greater working range

◆ Use of a yoke-suspended bucket gives the new Holan MV-50 elbow 30 per cent more working range than limited action aerial lifts with other types of bucket suspension, according to Holan Corp., Cleveland, Ohio, subsidiary of Ohio Brass Co.

Holan defines limited action as less than 270-degree upper arm travel, 120-degree lower arm travel. Upper arm travel of the company's new model is 135 degrees, lower arm travel is 85 degrees.



The elbow reaches up 50 feet, and out 30 feet on either side of body.

The two-man bucket pivots on the center line of the center of gravity inside the yoke. This suspension design and sufficient upper and lower arm travel, coupled with continuous rotation, permits linemen to work over parked cars, over and between power and telephone lines, and on the property side of the pole. The parallelogram mechanical leveling system automatically keeps the bucket level in all working positions.

The new elbow reaches up to a 50-foot working height, out 30 feet on either side of the body. The two-man bucket will handle 450 pounds in all positions and is made of quarter-inch-thick molded fiberglass reinforced plastic.

Adequate insulation in the bucket, yoke, and upper arm provides the safety needed to work on voltages up to 345,000 (a.c.). Approximately ten feet of the upper arm is made of fiberglass reinforced plastic of a square tubular design with the balance (lower section) made of high-tensile, low-alloy steel covered with dielectric material. The unit can be fitted with Holan's metal shielding kit for bare hand work on energized high-voltage lines.

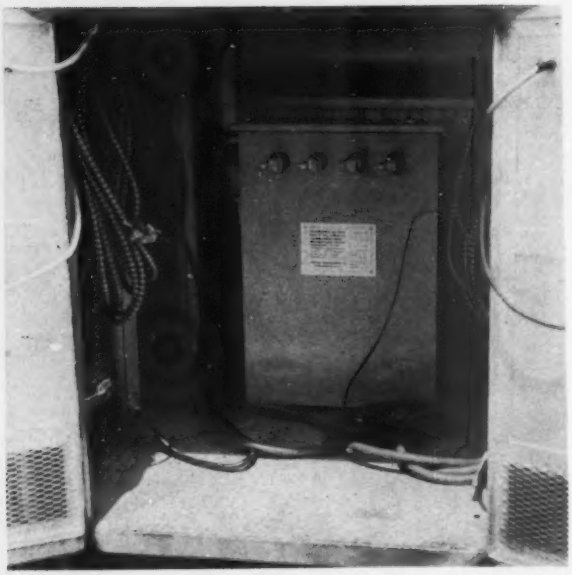
Using a straight upper arm, the unit can be fitted with two single buckets with patented bucket positioners. An optional winch mounted in the self-contained rotating superstructure with a sheave head at the end of the lower arm converts the elbow into a derrick that can "live boom" from 2,000 to 6,000 pounds.

(Continued on page 98)

Trailer-mounted transformers give emergency service

◆ In order to give their customers the utmost in service—even during emergencies — the New Jersey Power and Light Company had the Hindle Transformer Co., Flemington, N. J., make up several special portable transformers which are mounted in trailers.

Units are placed in a trailer and ride behind a truck.



The transformers are enclosed in a sheet metal housing.

This unit was designed to serve a dual function: as an emergency supply in case of transformer failure, and as a supplemental transformer for use in line changes or transformer changes.

The transformer was designed for extra-heavy, rugged portable operation, in that the unit would be placed in a trailer and ride behind a truck during transportation.

Considerable care was taken to insure that the windings of the transformer were free from all vibrations and shock. The transformer is rated at 50 kva, single-phase, 60 cycles, and is air-cooled; the primary is designed for 4,800 volts and the secondary for either 120 or 240 volts.

It is generously designed to withstand several hours with an overload as high as 50 per cent. The transformer is enclosed in a sheet metal housing complete with schematic diagrams and high-voltage circuit breakers.

The Unoreg is compact and light for convenient mounting on poles.

Automatic voltage regulator can cut investment for re-regulation in half

◆ A 2½ - kva self - contained automatic voltage regulator, called Unoreg, is being manufactured by the Westinghouse Electric Corp.

The new regulator and the earlier 1¼-kva units are designed for use on the low-voltage side of over 600 standard distribution transformer styles up through 50 kva.

A compact, lightweight design for convenient pole mounting, Unoreg provides plus and minus five per cent regulation of 120/240-volt secondary lines. Since it is a separate device, one style of the regulator can be used with a wide range of distribution transformers, saving up to 50 per cent of present allowable investment for re-regulation.

The two major areas of application for the device are bucking the raised secondary voltage of individual distribution transformers located at the head end of a feeder, and boosting the secondary voltage of individual distribution transformers located at or near the end of a long or heavily loaded feeder.

Unoreg consists of an induction regulator controlled by a solid-state voltage-regulating control.

This induction regulator has a new stator design which eliminates the need for a tertiary winding. Greater rigidity is achieved by using a yoke-shaft rotor construction rather than a through type shaft. Self-adjusting molded nylon bearings support the rotor in the center of the stator bore.

In keeping with the reliability of

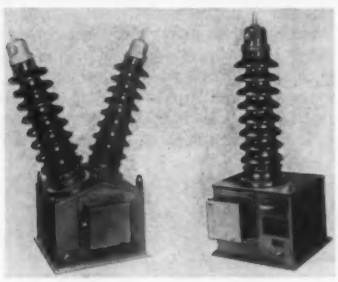
(Continued on page 98)

New utility equipment

Westinghouse transformers

A new line of oil-filled outdoor potential transformers (type APT) has been introduced by Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

They are among the smallest and lightest potential transformers in the industry. Rated at 25 through 69 kv, 150 through 350 kv BIL, the units



are suitable for metering or relaying applications and are available in single- or two-bushing design.

The units average ten per cent smaller and 20 per cent lighter than most previously available transformers. For example, a 69-kv single-bushing unit weighs only 570 pounds and is 57 inches high versus 675 pounds and 61 inches for previous units. These same size and weight advantages are carried through the 25-, 34.5-, and 46-kv designs.

This compact design was made possible by using the "solid insulation" principle, first introduced in large potential transformers of 115 kv and above, which eliminates the need for oil ducts.

Write U-1101 on reply card, p. 17

Olin color-coded cable

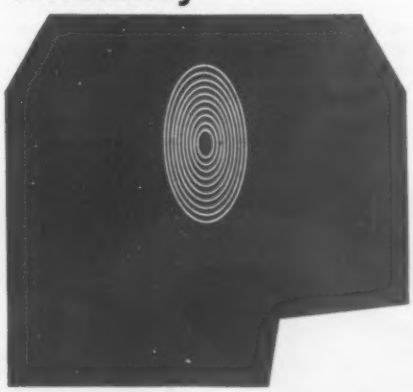
A service drop cable offered with insulation permanently color-coded so that utility men can identify its various sizes at a glance has been announced by Olin Conductors Section of Metals Div., Olin Mathieson Chemical Corp., Chattanooga, Tenn.

Combinations of phase wires in red, gray, or green, in addition to the familiar black, make it easy to pick out the desired size cable in the warehouse, on the service truck, and in the field without time-consuming tag hunting.

The new cable, called Compresto/Hypalon service drop cable, is insulated with Hypalon, a synthetic rubber manufactured by E. I. du Pont de Nemours & Co., Inc., that has outstanding resistance to weather, heat, oxygen, and ozone. Hypalon does not require large quantities of carbon black, as do other weatherproof coverings, to withstand the ef-

A Westinghouse Metal-Clad Switchgear advantage to you:

Isolated center coil arc chutes on DH breakers provide better magnetic field distribution and strength to increase arc interruption efficiency



For complete facts on Westinghouse metal-clad switchgear using DH magnetic air circuit breakers, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
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J-61019

fects of sun and weather, and therefore it can be colored in conformity with industry needs.

Olin Conductors' compound of Hypalon 40 is an insulation jacket rated at 600 volts and having insulation resistance values consistent with regular two-coat type service drop cables.

Write U-1102 on reply card, p. 17

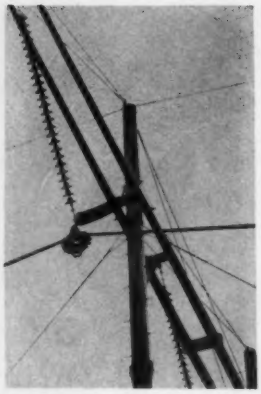
S&R stringing block

Sherman and Reilly, Inc., 1st and Broad Sts., Chattanooga 2, Tenn., has introduced their new flowing arch groove conductor stringing block.

Designed for large single conductors ordinarily requiring extremely large, heavy, conventional blocks, this block enables a large effective sheave diameter without the extreme size and weight.

The flowing arch is made up of 17 individual segments which ride on two ball bearing rollers to form an arch which supports the conductor. The result is a 40-degree included sheave section, the maximum ordinarily required even under adverse conditions.

The only size available at the present time has a 42-inch effective sheave diameter, but the over-all length, including the frame, is 30 inches. The weight is approximately



one-third that of the conventional single sheave block.

The obvious advantage is handling, however, more important is that the block will assume the proper attitude on angles. This is due to the minimum amount of weight below the point of support of the conductor.

Write U-1103 on reply card, p. 17

Kearney disconnect switch

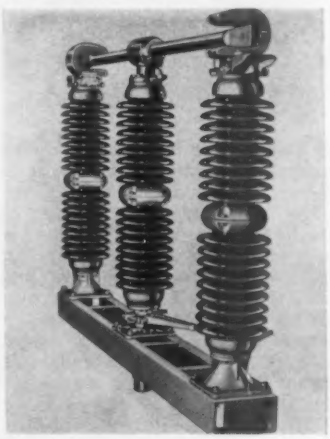
The model BR-60, side-break disconnect switch from the James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., is a group operated, double horizontal break air switch with three insulator stacks per pole.

It is designed for the 115- to 161-kv range.

The switch's blade pivots at its mid-section over the center stack and its motion is parallel to the switch base. The blade movement is controlled by rotation of the center insulator stack. The blade itself is made in one piece, of high-grade, high-conductivity, hard-drawn copper tubing flattened at both ends.

The contacts are of the reduced area, high pressure, self-wiping type. Contact pressure is obtained by stainless steel compression springs insulated from the current path.

Blade movement is obtained through the driving mechanism which is mounted on top of the center insulator stack. The first initial movement of the stack on opening rotates the blade 40 degrees around its longitudinal axis, relieving con-



tact pressure for easy opening. The balance of movement swings the blade to its full open gap.

Upon closing, the initial movement of the stack rotates the blade into the contacts, at which time the crank arm rotates the blade about its longitudinal axis, thus applying full contact pressure. This rotation provides a wiping action and a highly effective ice breaking feature.

Write U-1104 on reply card, p. 17

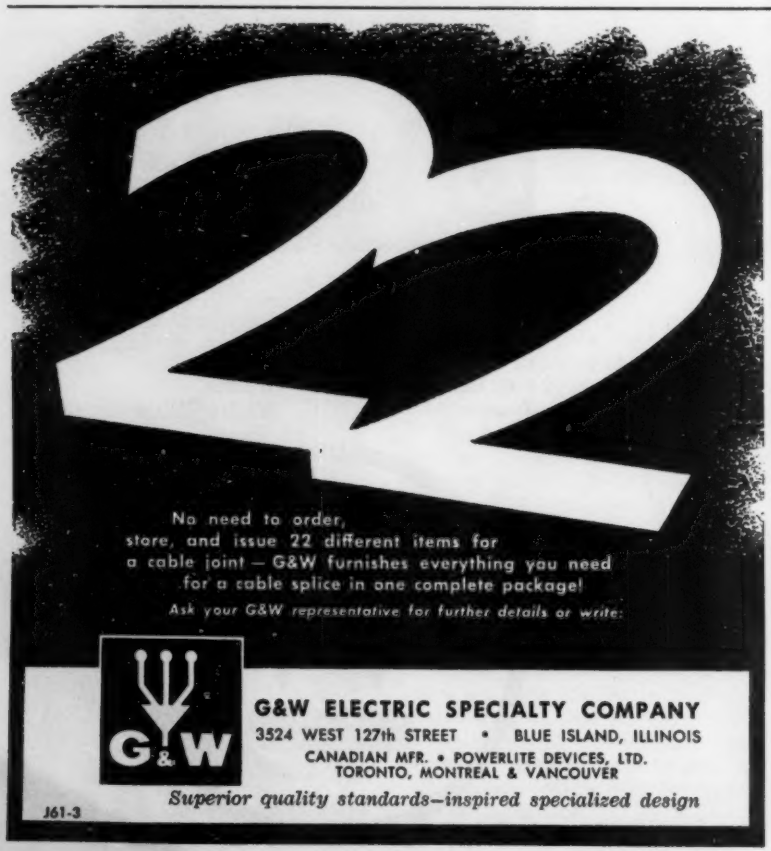
Bit and chip ejector unit

A unique boring bit and chip ejector combination, ideal for utility and telephone company use, is being introduced by Price and Rutzebeck, P. O. Box 30, Hayward, Calif.

The new device incorporates a chip ejector attachment with Planetor JL series bits to eliminate the problem of chip clogging in deep hole boring work on poles and timber structures.

The chip ejector, a steel spring with an attaching collar, can be field-added to all JL type bits.

In action, the ejector picks up chips immediately after they are freed, rolling them up the hole and


22
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Superior quality standards—inspired specialized design
J61-3

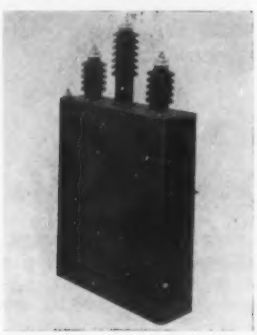
ejecting them so rapidly there is seldom an opportunity for chips to come together—and thus compact into a barrier.

Write U-1105 on reply card, p. 17

Westinghouse capacitors

The line of 100-kvar three-phase capacitors from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa., has been extended to include higher voltages: 12,470, 13,200, 13,800, and 14,400 volts.

They supplement present 2,400- and 4,160-volt ratings and extend the advantages of economical and compact fixed-kvar correction to the more



popular higher distribution voltages.

The higher voltage units are wye connected internally with the neutral connected to a ground stud on the outside of the case.

Since mounting brackets are available for single or double crossarm, and direct-pole mounting, the 100-kvar units can be installed on a standard pole at any point the load requires.

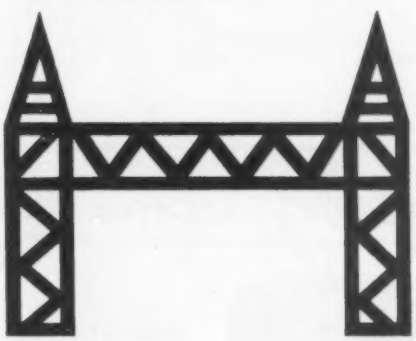
Write U-1106 on reply card, p. 17

Multi-Amp transformer tester

Distribution transformers can be checked readily with a mobile, completely self-contained test unit from Multi-Amp Electronic Corp., 61 Myrtle St., Cranford, N. J.

Primary voltage, exciting current, no-load loss, polarity, ratio, copper loss, and impedance can be verified on acceptance of the transformer,

A Westinghouse Outdoor Substation advantage to you: **Modular design substations let you make valuable time savings in engineering and erection, require minimum plot area and steel**



For complete facts on modular design outdoor substations, contact your local Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
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J-61020

after its installation, after reconditioning and at scheduled maintenance periods.

Model TTS-50 is used to test transformers rated 50 kva or less and model TTS-250 for ratings through 250 kva. Special test sets can be furnished for larger transformers.

Each includes metering, variable voltage source, multi-ratio potential transformer, and safety devices to protect the operator and the equipment. The units incorporate the necessary circuits and devices to efficiently and conveniently conduct the tests.

Each unit can be used when the transformer voltage ratios are 2,400, 4,800, 7,200, 13,200, or 14,400 volts on the primary side, and 120-240 volts on the secondary side. Other primary and secondary voltages and frequencies can be accommodated by special arrangement.

Write U-1107 on reply card, p. 17

I-T-E Victor insulators

Substantial cost, installation, and maintenance savings are provided by all-new switch and bus stacking insulators introduced by I-T-E Circuit Breaker Company's Victor Insulators Div., Victor, N. Y.

The new royal blue switch and bus insulators are available to switch

manufacturers, substation erectors, and utilities.

Two units serve for all applications ranging from 115 through 161 kv at 450 through 750 kv BIL—an added advantage in that utilities with multiple BIL requirements can cover them by stocking only two sizes for this wide range of applications. For any given BIL rating, the insulator units in a stack are identical.

The units' high strength alumina porcelain provides a greatly improved safety factor over standard electrical porcelain. Because it is approximately double the strength of conventional porcelain, breakage during and after installation is practically nil. Electrical ratings of the three-inch b.c. units are the same as this manufacturer's TR-140 five-inch b.c. units.

The insulators provide more leakage distance from live parts to ground than NEMA standard stacks of the same rating. Also, no 3½-inch spacer is required, as with conventional units, at the bottom of an insulator stack to meet full BIL rating.

Write U-1108 on reply card, p. 17

Lapp corona control device

A new grading device with improved corona control characteristics for 345-kv transmission has been developed by the Lapp Insulator Co., Le Roy, N. Y.

The design consists of two tubular aluminum sections in a novel configuration that combines effective shielding with neat, functional appearance. The grading device attaches directly to the yoke assembly,

shielding insulators, clamps, and conductors at the suspension end of the string.

The design successfully controls corona at the 345-kv operating level, minimizing the RIV of the line.

The grading devices are available for 345-kv use with bundled or single conductors in either single-string or V-string suspension and for dead-end application. They are lightweight, compact units, easier to install and more efficient and economical than similar devices currently in use.

Write U-1109 on reply card, p. 17

Delta-Star transformers

The new DS-50 bonus line of distribution transformers, now in production at H. K. Porter Co., Inc., Delta-Star Electric Div., 2437 Fulton St., Chicago 12, Ill., represents a basic design departure of internal transformer components.

The new units mark one of the first uses of aluminum strip in the low-voltage winding. A new core design eliminates mechanical stress in

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For all pick-up trucks, including the new compacts. Watertight compartments . . . double panel doors . . . recessed paddle handles with cylinder locks keyed alike. Eleven types, seven lengths available.

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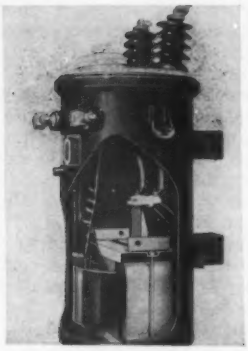


the final form, providing maximum magnetic performance.

The low-voltage windings of the DS-50 are made with aluminum strip conductor the full width of the coil. Optimum magnetic balance between the two windings is obtained, enabling the new units to withstand short circuit currents of more than 50 times rated current. This also means reduced weight, reduced hot spots, better regulation, and longer insulation life.

The new core employs an unusual method of fabrication that develops a stress-free assembly in rectangular configuration.

Write U-1110 on reply card, p. 17

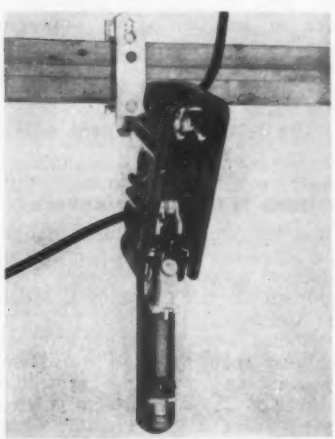
Kearney enclosed cutouts

The James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., has a new line of economical enclosed cutouts.

These can be quickly and inexpensively uprated in interrupting capacity or continuous ampere ratings to meet growing system needs, by merely changing cutout doors.

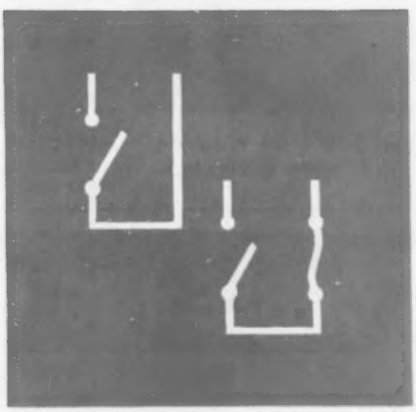
Each of two porcelain housings (for voltage ratings of 2.6/5.2 kv and 7.8 kv) accepts four interchangeable door assemblies. Door assemblies are available in 50- and 100-ampere continuous ratings and NEMA interrupting capacities up to 8,000 amperes at 7.8 kv, 10,000 amperes at 5.2 kv, and 14,000 amperes at 2.6 kv.

Doors can be easily inserted or re-



A Westinghouse Switchgear advantage to you:

Component selection in DFS drawout switch and fuse switchgear provides maximum application flexibility



For complete facts on DFS drawout switch and fuse switchgear, contact your local Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
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Some "Compact Trenchers" have Features Ditch Witch doesn't have!

It's true! Ditch Witch cannot boast such features as muscle power, operator harness, wind-up lines, or whiffle-trees. Maybe it is because we have never been able to see how this could result in a good trencher.

DITCH WITCH TRENCHER

ALL THE C4 DITCH WITCH CAN OFFER IS:

- MORE HORSEPOWER (7 H.P.)
- MORE DIG-POWER
- SELF-PROPELLED MOBILITY
- TOP PERFORMANCE
- HEAVIER CONSTRUCTION
- LOW-COST MAINTENANCE
- LONGER LIFE
- MAXIMUM ECONOMY

Of course, that seems to be what a lot of people want!

Self-propelled 7 HP Ditch Witch C4 trenches 3" to 6" wide, depths to 2'

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G&W CABLE NIGHTCAPS

Seal Unfinished Cable Joints Against Moisture And Dirt

Cable splicing no longer need be one continuous operation when G&W Cable Nightcaps are used. Unfinished cable joints or terminations can be left overnight or for several days at a time with complete assurance that work will remain dry and clean as when sealed.

The G&W Cable Nightcap consists of a heavy plastic sleeve, waterproof paper to keep the plastic clean, tape, desiccant, and humidity indicator. The sleeve is slipped over the unfinished joint and one end taped tightly to the cable. Desiccant and humidity indicator are then inserted into the sleeve and its remaining end taped to the cable on other side of the joint. Waterproof paper is laid over the sleeve for protection.

Further information on the Cable Nightcap is available from G&W Electric Specialty Company or consult your local G&W representative.

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Superior quality standards—inspired specialized design J61-1

moved with a standard hookstick. Insertion of a single screw converts the cutout from indicating to non-indicating.

Improved lower trunnion construction permits the entire fuse tube thrust to be absorbed by the trunnion and transmitted to the box and a heavy duty hanger, rather than to the contacts. Contacts are thus relieved of recoil-stress.

An efficient spring flipper whips the fuse cable out of the cartridge, aids low-fault interruption. Re-fusing is simple and foolproof; the cartridge locks firmly in position.

Write U-1111 on reply card, p. 17

Hughes-Keenan aerial boom

The new Skyworker model 1044a, from Hughes-Keenan Div., U. S. Air Conditioning Corp., P. O. Box 360, Delaware, Ohio, provides a working height of 50 feet, and is designed for the toughest requirements of line distribution work.

Despite its big reach, the 1044a is compact and highly maneuverable. Rotation of the mounting turret—40 degrees past full circle—insures wide

lateral movement, while the lower boom, moving through a vertical arc of 135 degrees, provides still greater versatility.

The new model was designed to combine in a single low-cost unit the ability to handle all routine line work plus the roughest demands of work at junction poles, outrigged crossarms, mid-span, and other difficult-to-reach areas. It is available with the Skyworker's new all fiberglass upper boom.

Write U-1112 on reply card, p. 17

Kuhlman transformer covers

Now available in a finish of light blue for easier identification are the Celuclad transformer covers from Kuhlman Electric Co., 2565 E. Maple Rd., Birmingham, Mich.

Celuclad covers, standard on all Kuhlman cover-mounted transformers, combined with the protective features of Quick-Grip hand connectors, prevent line-to-ground shorts

by animals and birds between terminals and the transformer cover.

The new light blue finish has the same extra-heavy cellulose coating, high dielectric strength, and better weathering characteristics of the ASA 24 gray Celuclad covers previously offered.

Write U-1113 on reply card, p. 17

Helpful literature

A ten-page booklet on 23- through 196/230-kv (IC) **interchangeable condenser bushings** is offered by the **Westinghouse Electric Corp.**, P. O. Box 2099, Pittsburgh 30, Pa. The well-illustrated publication, No. MB-1928, explains the design and applications of the bushings, which can be interchanged between transformers, circuit breakers, and standard ASA bushings of other manufacturers.

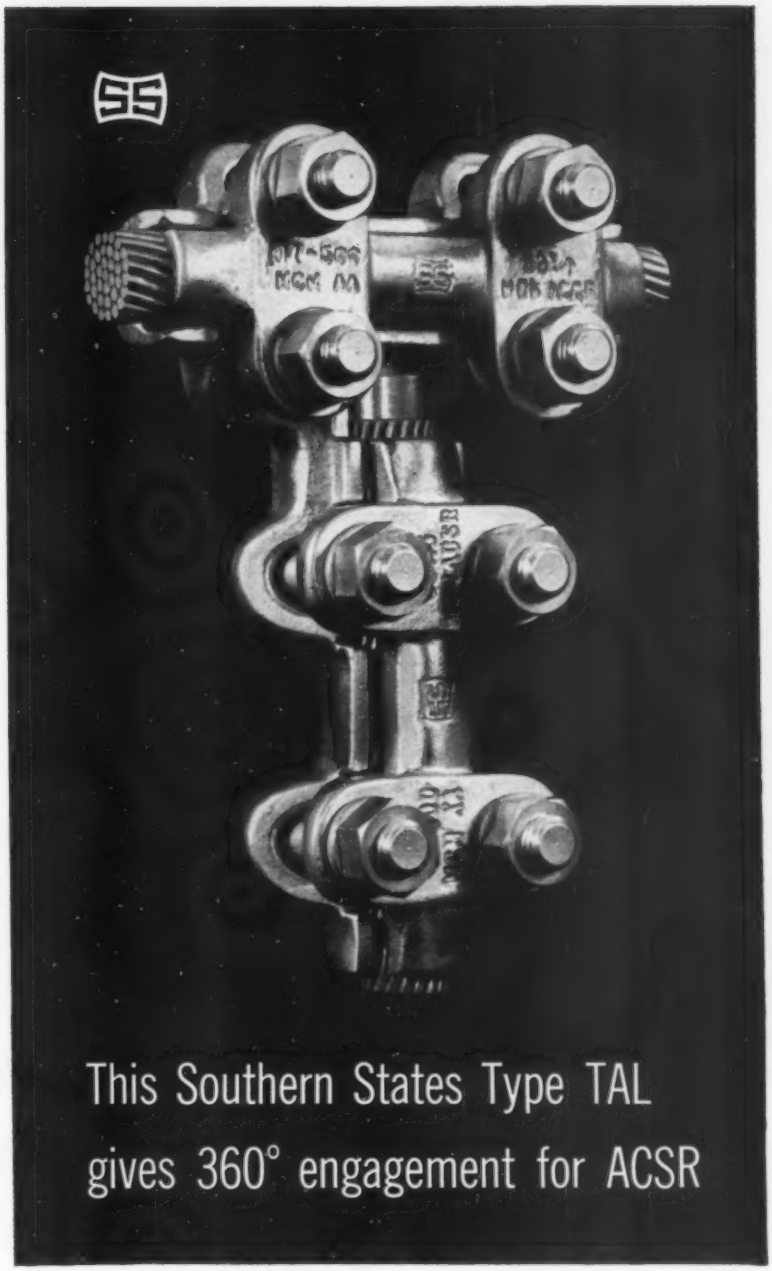
Write B-1114 on reply card, p. 17

"The ABC's of Regulators," No. 61052, an elementary treatise on single-phase, 32-step **distribution regulators**, is available from **Line Material Industries**, 700 W. Michigan St., Milwaukee 1, Wis. This bulletin has basic diagrams, rating tables, and calculation examples. Questions are answered on main components and their relating functions. Line drop compensator settings and their adaptability are explained.

Write B-1115 on reply card, p. 17

Bulletin GEA-7524, 16 pages, from **General Electric Co.**, 1 River Rd., Schenectady 5, N. Y., gives detailed information on the features, application, construction, and operation of G-E's new Permalex 65 **distribution transformer** which is designed to help utilities achieve lower overhead costs and higher efficiency. The bulletin covers pole type ratings through 100 kva, 15 kv and below, and includes photographs, charts, cutaway and line drawings, dimensional diagrams, and rating tables for type HS and HSBA transformers.

Write B-1116 on reply card, p. 17



The unique design features of this connector reflect the engineering behind the entire Southern States line of fittings. For instance, to assure good electrical and mechanical characteristics, it provides independent clamping on run and tap conductors; its maximum contact engagement minimizes conductor clamping stresses; and conductor-fitting grooves limit cable distortion.

SS SOUTHERN STATES
HAMPTON, GEORGIA

For more details on above items, use reply card on page 17

Penelec picks Electro-Motive

Sixteen miles from Dushore, in northeastern Pennsylvania, Pennsylvania Electric Company has installed its first 4000 KW Electro-Motive Diesel Peaking Plant to provide a reliable secondary source of power, and to improve service continuity to customers in the immediate area.

PEAKING POWER—In addition to providing area protection for Penelec, the Electro-Motive Plant will also operate automatically and unattended as a peaking power generator during hours of greatest demand. It is remotely controlled from Penelec's East Towanda Dispatching Center 29 miles away.

AUTOMATIC DEAD-LOAD PICKUP—In the event of an emergency power failure on the line, the Electro-Motive Plant will automatically start, come up to full speed, synchronize and pick up the area load, within 90 seconds. It will continue to provide emergency power until the line failure is corrected and will then automatically shut down.

POINT-OF-LOAD POWER—Because the Electro-Motive Plant operates automatically and unattended, Penelec was able to place it conveniently at the point of load demand for maximum savings in generation and distribution equipment investment. The compact, portable Electro-Motive equipment operates quietly and smoke-free, making it a good neighbor.

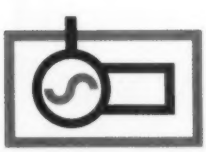
ADAPTABLE TO ANY SYSTEM—The inherent design characteristics of the Electro-Motive equipment on the Penelec system that make it

Diesel Plant for area protection

ideal for area protection and peaking power, also make it well suited for many of your system requirements:

- fast start for spinning reserve
- automatic dead load pick-up for area protection
- unattended operation for remote peaking service
- portability for simple installation
- freedom from damage to components caused by rapid thermal changes occurring from start to full load.

Available in units from 2000 KW to 10,000 KW, the Electro-Motive peaking equipment line contains both Diesel and dual-fuel plants that permit matching the plant to exact requirements for the most economical and efficient operation at the lowest investment. Ask your Electro-Motive representative for complete details.



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New series of tables extended to include larger hourly rates

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

DRILLING HOLES BY HAND - IN WOOD

CONDUIT SIZE	HOURS PER FT.	LABOR COST PER FT. AT FOLLOWING RATES 2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2 & 3/4"	.35	.70	.79	.88	.96	1.05	1.14	1.23	1.31	1.40	1.49	1.58
1 "	.47	.94	1.06	1.18	1.29	1.41	1.53	1.65	1.76	1.88	2.00	2.12
1 1/4"	.58	1.16	1.31	1.45	1.60	1.74	1.89	2.03	2.18	2.32	2.47	2.61
1 1/2"	.70	1.40	1.58	1.75	1.93	2.10	2.28	2.45	2.63	2.80	2.98	3.15
2 "	1.1	2.20	2.48	2.75	3.03	3.30	3.58	3.85	4.13	4.40	4.68	4.95
2 1/2"	1.2	2.40	2.70	3.00	3.30	3.60	3.90	4.20	4.50	4.80	5.10	5.40
3 "	1.4	2.80	3.15	3.50	3.85	4.20	4.55	4.90	5.25	5.60	5.95	6.30
4 "	1.7	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.38	6.80	7.23	7.65
		CONCRETE (AVERAGE HARDNESS)										
1/2 & 3/4"	1.9	3.80	4.28	4.75	5.23	5.70	6.18	6.65	7.13	7.60	8.08	8.55
1 "	2.1	4.20	4.73	5.25	5.78	6.30	6.83	7.35	7.88	8.40	8.93	9.45
1 1/4"	2.7	5.40	6.08	6.75	7.43	8.10	8.78	9.45	10.13	10.80	11.48	12.15
1 1/2"	3.0	6.00	6.75	7.50	8.25	9.00	9.75	10.50	11.25	12.00	12.75	13.50
2 "	3.3	6.60	7.43	8.25	9.08	9.90	10.73	11.55	12.38	13.20	14.03	14.85
2 1/2"	3.7	7.40	8.33	9.25	10.18	11.10	12.03	12.95	13.88	14.80	15.73	16.65
3 "	4.	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
4 "	4.3	8.60	9.68	10.75	11.83	12.90	13.98	15.05	16.13	17.20	18.28	19.35

E-102-B

LABOR: Includes setting up tools and drilling.

11-61

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DRILLING HOLES BY HAND - BRICK

CONDUIT SIZE	HOURS PER FT	LABOR COST PER FOOT AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2 & 3/4"	1.8	3.60	4.05	4.50	4.95	5.40	5.85	6.30	6.75	7.20	7.65	8.10
1 "	2.	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
1 1/4"	2.4	4.80	5.40	6.00	6.60	7.20	7.80	8.40	9.00	9.60	10.20	10.80
1 1/2"	2.7	5.40	6.08	6.75	7.43	8.10	8.78	9.45	10.13	10.80	11.48	12.15
2 "	3.1	6.20	6.98	7.75	8.53	9.30	10.08	10.85	11.63	12.40	13.18	13.95
2 1/2"	3.4	6.80	7.65	8.50	9.35	10.20	11.05	11.90	12.75	13.60	14.45	15.30
3 "												
4 "		8.60	9.68	10.75	11.83	12.90	13.98	15.05	16.13	17.20	18.28	19.35
		STONE AND CONCRETE RUBBLE										
1/2 & 3/4"	2.3	4.60	5.18	5.75	6.33	6.90	7.48	8.05	8.63	9.20	9.78	10.35
1 "	2.7	5.40	6.08	6.75	7.43	8.10	8.78	9.45	10.13	10.80	11.48	12.15
1 1/4"	3.3	6.60	7.43	8.25	9.08	9.90	10.73	11.55	12.38	13.20	14.03	14.85
1 1/2"	3.6	7.20	8.10	9.00	9.90	10.80	11.70	12.60	13.50	14.40	15.30	16.20
2 "	4.1	8.20	9.23	10.25	11.28	12.30	13.33	14.35	15.38	16.40	17.43	18.45
2 1/2"	4.6	9.20	10.35	11.50	12.65	13.80	14.95	16.10	17.25	18.40	19.55	20.70
3 "	5.0	10.00	11.25	12.50	13.75	15.00	16.25	17.50	18.75	20.00	21.25	22.50
4 "	5.5	11.00	12.38	13.75	15.13	16.50	17.88	19.25	20.63	22.00	23.38	24.75

E-102-B

LABOR: Includes setting up tools and drilling.

11-61

DRILLING HOLES "BY POWER"
WOOD

CONDUIT SIZE	HOURS PER FT.	LABOR COST PER FT. AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2 & 3/4"	.22	.44	.495	.55	.61	.66	.72	.77	.83	.88	.94	.99
1 "	.27	.54	.61	.68	.74	.81	.88	.95	1.01	1.08	1.15	1.22
1 1/4"	.33	.66	.74	.83	.91	.99	1.07	1.16	1.24	1.32	1.40	1.49
1 1/2"	.33	.66	.74	.83	.91	.99	1.07	1.16	1.24	1.32	1.40	1.49
2 "	.4	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80
2 1/2"	.44	.88	.99	1.10	1.21	1.32	1.43	1.54	1.65	1.76	1.87	1.98
3 "	.49	.98	1.10	1.23	1.35	1.47	1.59	1.72	1.84	1.96	2.08	2.21
4 "	.55	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06	2.20	2.34	2.48
5 "	.61	1.22	1.37	1.53	1.68	1.83	1.98	2.14	2.29	2.44	2.59	2.75
6 "	.66	1.32	1.49	1.65	1.82	1.98	2.15	2.31	2.48	2.64	2.81	2.97
		BRICK										
1/2 & 3/4"	.44	.88	.99	1.10	1.21	1.32	1.43	1.54	1.65	1.76	1.87	1.98
1 "	.55	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06	2.20	2.34	2.48
1 1/4"	.66	1.32	1.49	1.65	1.82	1.98	2.15	2.31	2.48	2.64	2.81	2.97
1 1/2"	.66	1.32	1.49	1.65	1.82	1.98	2.15	2.31	2.48	2.64	2.81	2.97
2 "	.77	1.54	1.73	1.93	2.12	2.31	2.50	2.70	2.89	3.08	3.27	3.47
2 1/2"	.87	1.74	1.96	2.18	2.39	2.61	2.83	3.05	3.26	3.48	3.70	3.92
3 "	.99	1.98	2.23	2.48	2.72	2.97	3.22	3.47	3.71	3.96	4.21	4.46
4 "	1.1	2.20	2.48	2.75	3.03	3.30	3.58	3.85	4.13	4.40	4.68	4.95
5 "	1.3	2.60	2.93	3.25	3.58	3.90	4.23	4.55	4.88	5.20	5.53	5.85
6 "	1.4	2.80	3.15	3.50	3.85	4.20	4.55	4.90	5.25	5.60	5.95	6.30

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News of the industry

edited for Southern readers

AIEE plans exposition with technical program

A FULL-SCALE five-day technical program that will blanket the entire electrical-electronics field is in the making for the first industry-wide gathering of its kind—the Winter General Meeting of the American Institute of Electrical Engineers and the 1962 Electrical Engineering Exposition in New York City.

More than 800 research engineers in every segment of the electrical-electronics industry have been invited to present technical papers at some 120 separate sessions that will be held January 29 through February 2, 1962.

Nelson S. Hibshman, executive secretary of the AIEE, said that at least 35 per cent of the technical sessions will be held in meeting rooms in the New York Coliseum, scene of the Electrical Engineering Exposition which the AIEE is sponsoring.

"This," said Mr. Hibshman," will make it possible for those attending the conference sessions to move more easily into the exhibit areas where they will see actual demonstrations of the principles, procedures, and materials they had heard discussed. This is a part of our deliberate effort to integrate the technical and scientific sessions with the exposition."

Mr. Hibshman said that the Electrical Engineering Exposition "is by no means the trade show or product supermarket that has become the common standby in some other industries."

"This exposition," Mr. Hibshman said, "is an entirely new approach to the concept of the trade show. It is more than just a show of products and services offered by the nation's leading suppliers of equipment, components, materials, and methods in the electrical-electronics industry. It is a teaching exposition specifically designed to augment the AIEE technical sessions."

Mr. Hibshman pointed out that the exhibits at the exposition will be based upon the research efforts of electrical-electronics engineers from throughout the country.

He said they will provide the attending AIEE engineers with first-hand visual evidence of the advancing technology of the electrical-electronics industry and help keep them abreast of the great range and swift pace of developments in electrical engineering.

H. F. Grebe, exhibits manager of the Reber-Friel Company of Philadelphia, nationally known exposition management firm in charge of the exposition, said a review of the exhibits shows "this will not be a one-subject affair."

"Exhibits," Mr. Grebe said, "will represent every segment of the electrical-electronics industry. The entire exposition will be a haven for the cross-breeding of ideas. Techniques displayed by one segment of the industry will spark the imagination for individual applications in another segment.

"New products in one area will lead to new solutions to problems in another." He said that 40 per cent of the exhibit space has already been reserved and that space assignments are now being made.

S. C. utility dedicates turbine package plant

ONE OF THE WORLD'S first package type gas turbine plants went into operation recently following ceremonies in which South Carolina Electric and Gas Company president S. C. McMeekin dedicated the machine "to free enterprise and to a freedom-giving Constitution."

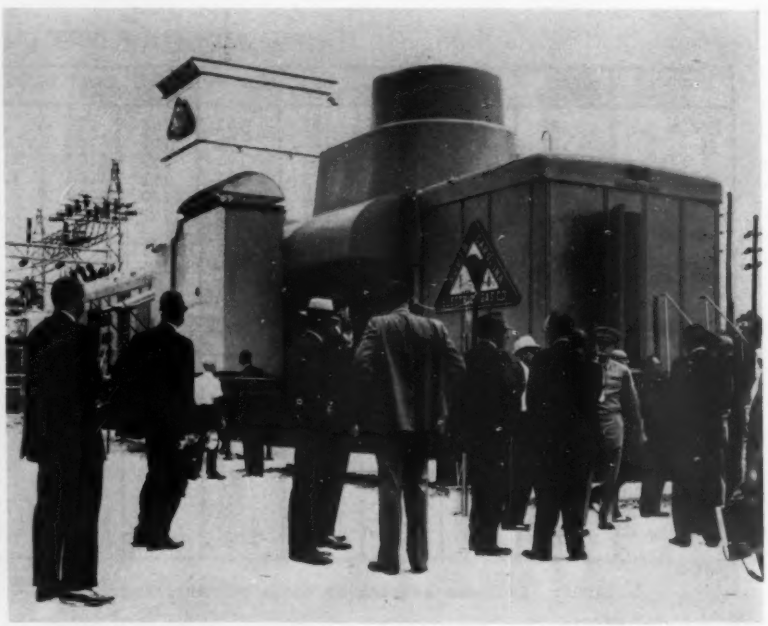
This new concept in electric power generation may be turned off and on from SCEGCO's central dispatching office in Columbia, and it will be used chiefly for emergency conditions and "peaking" purposes. The 11,250-kw unit is capable of supplying additional power needs for more than 12,000 customers of the Beaufort, S. C., area.

It is the first of four units which SCEGCO is buying from General Electric Co., developer of the plant. A second unit has been sent to Charleston, and the other two will be placed later.

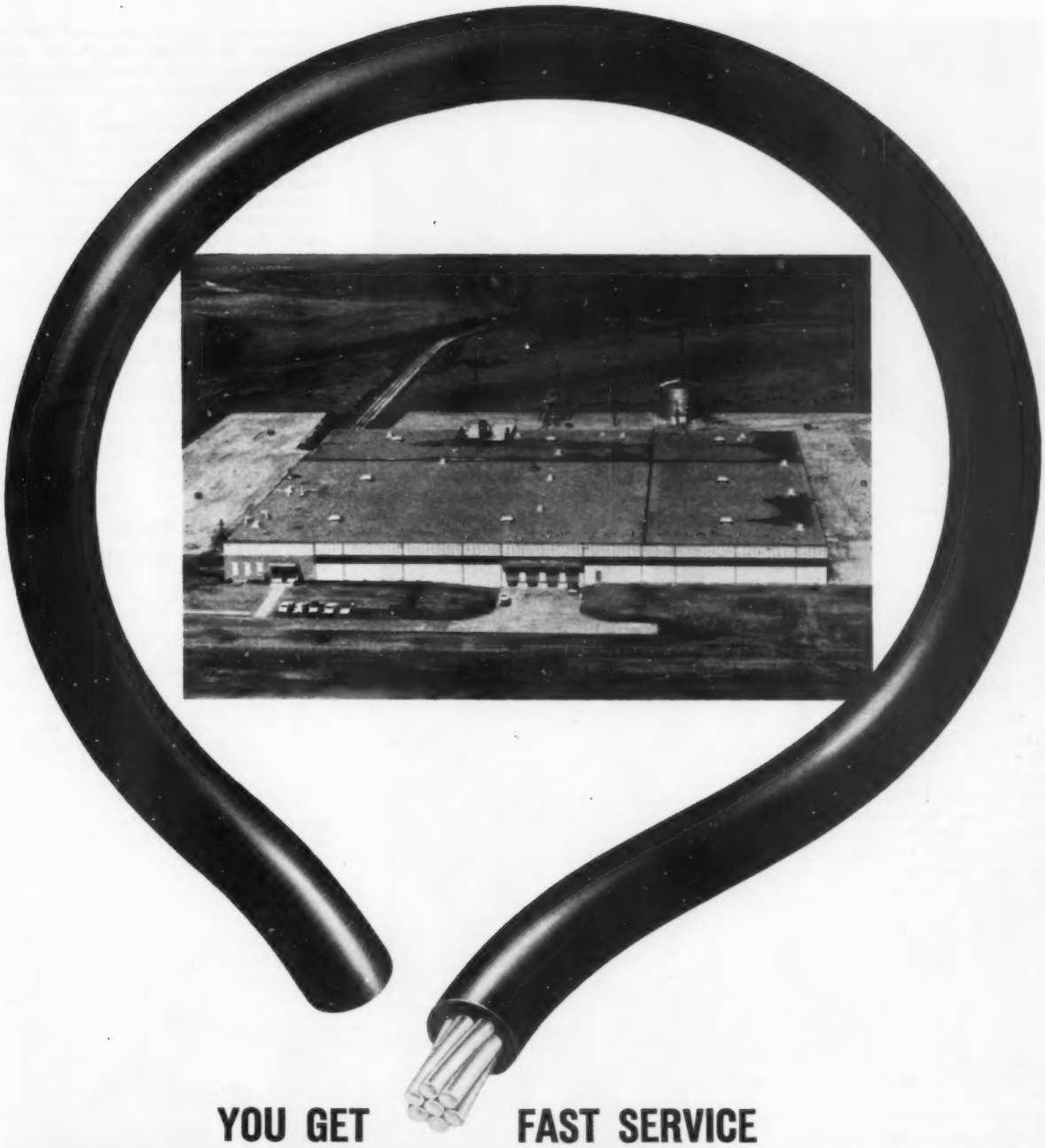
The plant was described as "ideal" for local emergency use, and when used in conjunction with a second unit might even provide a good base load for the Beaufort area.

Among the advantages of the package plant is the fact that it is self-cooled, eliminating the need for a raw water supply. Also, because it is in a package, so to speak, it can be set up anywhere there are transmission lines and a natural gas supply.

The generator is part of a three-year, $73-million expansion by the utility.



Dedication day visitors examine the South Carolina Electric and Gas Company's new gas turbine package plant, now in operation at Beaufort, S. C.



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For more details on above items, use reply card on page 17

W. R. Persons, president of Emerson Electric, discusses the importance of distributor-manufacturer cooperation in the development of the electric heat market during a recent electric heat training school and workshop.

Emerson school covers electric space heating

SIXTEEN DISTRIBUTORS from the South and Midwest attended a two-day electric heat training school and workshop at Emerson Electric headquarters in St. Louis recently.

An expanded version of Emerson's electric heat field training program was presented with sessions devoted to heat loss calculation, equipment choice, function and application, and successful sales techniques, as well as the benefits and competitive advantages of electric heat.

This is one of several workshops scheduled in St. Louis by Emerson Electric this year for distributors interested in becoming a part of the growing electric heat market. Company heat specialists in the field have also conducted over a hundred training programs since the company introduced its installer training course last October.

NEMA certification plan to rate cooling capacity

MANUFACTURERS producing more than 85 per cent of all of the room air conditioners sold in the United States have joined the certification program sponsored by the National Electrical Manufacturers Association.

Beginning with 1962 models, NEMA will certify the accuracy of Btu-per-hour cooling capacity ratings of all units made by participating companies.

Certified models will be identified by a seal permanently affixed to the unit. A directory, kept up to date by frequent revisions and supplements, will be issued so that the trade and the public will have available an accurate list of certified units and their cooling capacities. January 2, 1962, is the publication date of the first issue.

Specimens of models representing more than half of each manufacturer's annual volume will be tested for cooling capacity in accordance with NEMA Standard CN1. At least 50 per cent of a company's total number of models, including all popular sizes, both free-standing and through-the-wall, must undergo testing.

Tests will be conducted by Electrical Testing Laboratories, Inc., the program administrator, or by participating companies under ETL's supervision. The program permits "challenge testing" by a manufacturer of another participant's air conditioner.

G&W's representative to serve more states

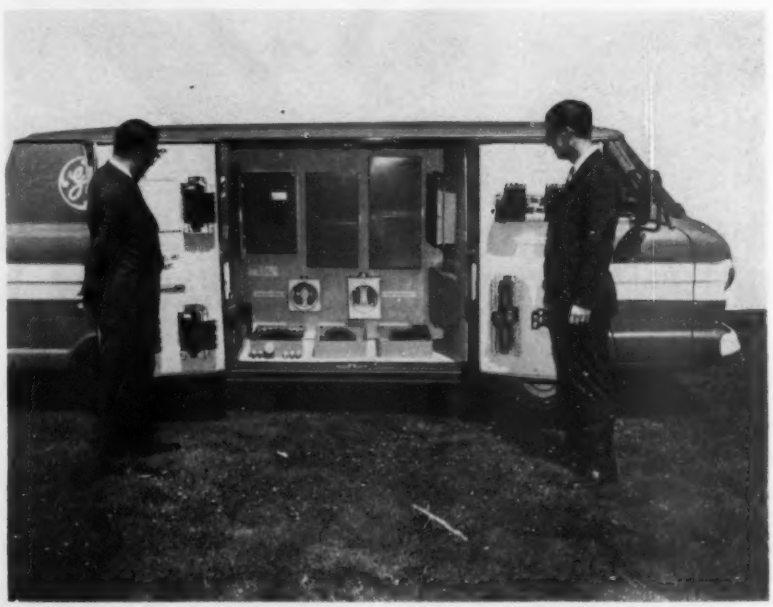
GREGORY-SALISBURY CO., G&W Electric Specialty Company sales representative in the Arkansas and west Tennessee area, has been appointed to also handle G&W sales in Louisiana and Mississippi.

G-E Circuit Rider shows products to distributors

GENERAL ELECTRIC is sending three updated versions of the famed 19th century Yankee peddler on a circuit around the country to introduce its newest products to electrical distributors.

To speed news about developments in electrical apparatus to the customer's doorstep, today's Yankee peddler travels in a mobile display van, named the G-E Circuit Rider.

Each Circuit Rider is fitted with special display panels on which are mounted the newest lines of six G-E product departments.



General Electric is using three Circuit Rider display vans to introduce its newest products to electrical distributors. Six product lines are carried.

New products include 4-in-1 circuit breaker/fusible load centers, home lightning protectors, meter sockets, safety switches, current limiting fuses, molded case circuit breakers. busway, panelboards, and specialty transformers.

Each Circuit Rider is assigned to a specific sales district for a period of time. Within the district, presentations are scheduled for the electrical distributors' houses. The trucks are also available for trade shows, job site calls on contractors, and visits to utilities.

Dallas requires breaker non-interchangeability

As of November 1, 1961, the Electrical Inspection Office of Dallas, Texas, began requiring all breaker panels and fuse panels installed in residential and other occupancies in the city of Dallas to be of the non-interchangeable or non-tamperable type as per Section 240 of the 1959 edition of the National Electrical Code.

The only exception will be in occupancies where supervision and maintenance will assure that over-current protective devices and branch circuit wiring will be maintained at proper rating.

The inspection authorities provided for some continued use of interchangeable circuit breakers where inventories of this type acquired previously have not been entirely depleted.

In another recent bulletin, the Dallas Electrical Inspection Office required all dishwashers and outlets for washing machines in residential areas to be on separate 20-ampere grounded circuits.

A kitchen disposal may be placed on one of the 20-ampere grounded circuits required for kitchen and dining areas. The disposal may be wired in direct by metallic raceway or by a three-wire, heavy-duty cord with grounding type cap and outlet.

The grounding conductor must be a part of the cable assembly from the panel to the outlet box.

Grid system to include two Louisiana utilities

An interconnected, investor-owned, nationwide electric power grid transmission system to be initiated sometime this year will encompass two Louisiana utilities.

New Orleans Public Service, Inc., and Louisiana Power and Light Company will be included in the grid, it was announced recently by G. L. Andrus, president of the New Orleans utility, and W. O. Turner, chairman of the board and chief executive officer of LP&L.

The two men said that the com-

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REPRESENTATIVES:
Cary Chapman & Co., Atlanta—New Orleans—Greensboro—Birmingham
Suchman Associates, Inc., Miami
NuRo Company, Houston—Dallas—San Antonio

plete interconnection of the nation's power systems is the logical next step in the evolution of power supply in this country.

They went on to say that the bulk of the new transmission lines will be built by investor-owned companies and that they will be financed in the free market.

Peabody organization to carry Wagner line

PEABODY BROTHERS has been appointed sales agent for Wagner Fittings Division of Pittsburgh Standard Conduit Company for the Texas and Oklahoma territory.

Peabody will carry a complete stock of fittings in the Dallas, Texas, warehouse at 2903 St. Louis Street for overnight service anywhere in the territory.

Wiegmann picks Swartz for south Texas area

THE RECENT APPOINTMENT of Arthur H. Swartz, of 2120 Polk St., Houston, Texas, to represent E. M. Wiegmann and Co., Inc., has been announced by Edward H. Prott, sales manager of the company.

Mr. Swartz will cover south Texas, while the remainder of the state will be covered by Fain Associates, Dallas.

C. J. Ellis

Ellis to succeed Redd in Atlanta G-E post

THE PENDING RETIREMENT of Carter L. Redd, General Electric's Southeastern region vice-president in Atlanta, and the election of Charles J. Ellis as his successor were announced recently by Ralph J. Cordiner, G-E chairman of the board.

Mr. Ellis, has been serving as district manager of electric utility sales for G-E in Tampa, Fla. He will assume his new post in Atlanta immediately.

As Southeast regional vice-president, Mr. Ellis will have broad corporate responsibilities in his seven-state region, Mr. Cordiner said. The region includes North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, and Tennessee.

Mr. Redd, regional vice-president in Atlanta since 1956 and a veteran of 40 years association with the company, will serve as consultant to Mr. Ellis until January 1, 1962, when his retirement becomes effective.

Mr. Ellis received his BS degree from the U.S. Naval Academy in 1939, and after several engineering assignments with General Electric in Schenectady, N. Y., he was transferred to the Chattanooga, Tenn., sales office in 1937.

Later he served as manager of the Tampa office, then manager of user industry sales for Florida. Following this, he became district manager of electric utility sales for Florida.

Mr. Redd joined General Electric in 1922, the year he graduated from Virginia Polytechnic Institute with a BS degree in electrical engineering.

After a year on the company's engineering test program in Schenectady, N. Y., he was assigned to the Apparatus Sales Division in the Southeast, serving in various sales capacities in Birmingham and Atlanta until World War II.

In 1945 he was appointed South-

C. L. Redd

eastern district manager of the Apparatus Sales Division with headquarters in Atlanta, a post he held for 11 years, and in 1956, he was elected a regional vice-president.

Dates ahead

Southeastern Electric Exchange, Sales, Advertising, and Public Relations Conference, Tides Hotel, St. Petersburg, Fla., Nov. 15-17, 1961.

National Electrical Manufacturers Association, Annual Meeting, Plaza Hotel, New York, N. Y., Nov. 16, 1961.

American Institute of Electrical Engineers, Winter General Meeting, Hotel Statler, New York, N. Y., Jan. 28-Feb. 2, 1962.

Missouri Valley Electric Association, Industrial and Commerical Sales Conference, President Hotel, Kansas City, Mo., Feb. 15-16, 1962.

Sixth National Electrical Industries Show, New York Coliseum, March 11-14, 1962.

National Electric Comfort Heating Exposition and Symposium, Sherman Hotel, Chicago, Ill., March 19-21, 1962.

Southeastern Electric Exchange, 29th Annual Conference, Boca Raton Hotel and Club, Boca Raton, Fla., March 26-28, 1962.

American Institute of Electrical Engineers, South Central District Meeting, Hotel Peabody, Memphis, Tenn., April 4-6, 1962.

Missouri Valley Electric Association, Engineering Conference, Muehlebach Hotel, Kansas City, Mo., April 11-13, 1962.

Illuminating Engineering Society, Southeastern Region, King Edwards Hotel, Jackson, Miss., April 12-13, 1962.

AIEE-ISA-ARS-IAS, National Telemetering Conference, Sheraton-Park Hotel, Washington, D. C., May 23-25, 1962.

Illuminating Engineering Society, Inter Mountain Region, Western Skies Hotel, Albuquerque, N. M., May 24-25, 1962.

Over 300 attend IAEI convention in Asheville

OVER 300 DELEGATES and visitors attended the Asheville-hosted 33rd annual meeting of the Southern Section, International Association of Electrical Inspectors, which took place October 15-18.

Code discussion panels were moderated by F. G. Camus, electrical contractor, Shreveport, La., and G. W. Flach, chief electrical inspector, New Orleans, La. A reception, banquet, floorshow, and dance provided entertainment for the 300 men at-

tending the convention and approximately 115 wives.

Chairman of the meeting was M. B. Haynes, Jr., of M. B. Haynes Electric Corp., Asheville.

The Code panel consisted by T. P. Branch, Rural Electrical Administration, Washington, D. C.; E. F. Cogan, secretary-treasurer, IAEI, Chicago, Ill.; O. K. Coleman, Edison Electric Institute, Lafayette, Ind.; L. S. Inskip, Bell Telephone Laboratories, Murray Hill, N. J.; R. L. Lloyd, National Bureau of Standards, Washington, D. C.; B. H. Martin, Tennessee Valley Authority, Chattanooga, Tenn.; B. Z. Segall, Consulting Engineer, New Orleans, La.; E. C. Soares, Pringle Electric Manufacturing Co., Jersey City, N. J.; Frank Stetka, Electrical Field Engineer, NFPA, Chicago, Ill.; K. P. Stiner, ITE Circuit Breaker Co., Detroit, Mich.; H. B. Whitaker, chairman of the electrical section, NFPA, New York, N. Y.; and Joseph Whitner, Southeastern Underwriters Association, Atlanta, Ga.

Southern Section officers elected for the coming year are president, S. W. Thomas, Shreveport, La.; first vice-president, C. L. Fogelgren, Lynnhaven, Va.; second vice-president, R. L. Payne, Dallas, Texas; secretary-treasurer, A. M. Miller, Richmond, Va.; assistant secretary, M. L. Young, Fairfax, Va.; and chaplain, D. S. Nichols, Raleigh, N. C.

Representatives to the IAEI executive council are R. E. Ward, Nashville, Tenn.; and Dewey L. Johnson, Atlanta, Ga.

Code questions were submitted before the panel began discussion and were mimeographed for distribution to everyone attending the meetings. The method met with the widespread approval of delegates, and according to panel member E. C. Soares, "The idea of preparing the questions in advance has been of great help to the panel in enabling the members to give an answer which received proper preparation. The interest of the various members reflected the correctness of this method of handling questions."

In commenting on the questions in general, Mr. Soares stated, "This is as fine a list of questions as I have seen in a long time, and reflects a great deal of credit on the men who prepared them."

Present at the convention were national IAEI president G. C. Monroe and Mrs. Monroe, from Springfield, Mo.

Chance selects Ogilvie as new representative

THE A. B. CHANCE Co., Centralia, Mo., has announced the appointment of Morgan O. Ogilvie, as a line construction materials representative for Alabama, Georgia, and western Florida.

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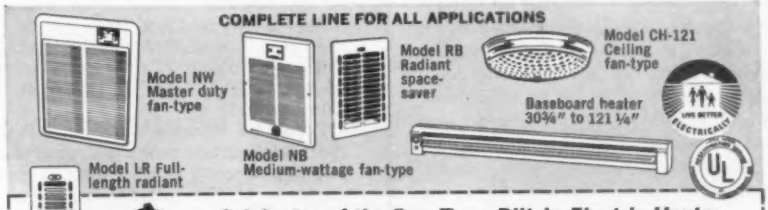
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Model LR Full-length radiant

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Load-Break Dependability is the third of three important requirements for Service Entrance switches. The first two: Electro-Mechanical Strength and Operating Performance. Be sure the switch you specify exceeds all in-service requirements in these basic areas.

Extensive tests were run on the Pringle LOAD BREAK Switch to prove its reliability. Example of Load-Break Dependability: Switch opened and closed against 15,000A. 510V. — no damage to the switch! Also, switch opened 22,000A. 510V. — again no switch damage.

Get the full detailed report. Just write for Test Report Bulletin P-112.

Pringle ELECTRICAL MANUFACTURING COMPANY

1908 N. SIXTH ST., PHILADELPHIA 22, PA.

News about people

George J. Kennedy has been named to the post of general sales manager of Day-Brite Lighting, Inc., St. Louis, Mo.

Mr. Kennedy was previously in New York as manager of the company's Eastern sales region and coordinator of national accounts. Before joining Day-Brite, he was general commercial sales manager of

George J. Kennedy

Graybar Electric Co., Inc. He has studied marketing as well as engineering and received his BS degree in electrical engineering at Worcester Polytechnical Institute.

Mr. Kennedy's new headquarters will be in Day-Brite's national executive offices in the St. Louis suburb of Clayton, Mo.

Henry H. Startzman, vice-president of engineering and power production for the Potomac Edison Co., recently retired from active service.

Mr. Startzman, who received his degree in engineering from Johns Hopkins University, joined Westinghouse Electric Company as a graduate student in 1919, later served in the sales department, and joined Potomac Edison in 1928 as manager of the merchandise department at Cumberland.

Later he became manager of the industrial power sales and engineering department, then assistant chief engineer of the engineering department. He became assistant vice-president and chief engineer in 1951.

In 1954 he was named vice-president, and served as a member of the board of directors. Until June of this year, he has also been a member of the executive committee of the board.

Mr. Startzman is credited with contributing to both the physical and the staff growth of the company during his service.

Moloney Electric Company has announced the appointment of **William H. Schiek** as manager of sales for the Switchgear Div.

Mr. Schiek has been associated with the metalclad switchgear field since 1936 and is widely known in the electric industry.

In the series of other moves, Moloney made the following changes in sales and advertising department personnel: **George J. Boje** joined the sales department of the Switchgear Div., **D. E. Cragen** was promoted to the St. Louis sales department, **A. P. Samuel** succeeds Mr. Cragen as advertising manager, and **Charles E. Donovan** was named manager of the repair and replacement service department.

Fred E. Lindsey has been elected president and chairman of the board of the South Louisiana Chapter of NECA.

Other officers include **Henry O. Rocker,** vice-president; **R. C. Pflueger, Jr.,** treasurer; and **Michael Elgutter,** secretary-manager.

Additional members of the board of directors also include **Walter J. Barnes, E. M. Brignac, Sr., P. D. Lambert,** and **Henry Muller.**

The James R. Kearney Corporation of St. Louis and Hubbard and Company of Chicago jointly announce the election of **Charles P. Wenner** as chairman of the board of directors of both companies.

Presently, Mr. Wenner is president of Kearney and a director of Hubbard. He will replace **Franklin H. Kissner,** former chairman of both companies, who has resigned but who will remain a director of both companies.

John R. Morrill was elected president of James R. Kearney Corpora-

Charles P. Wenner

John R. Morrill

tion at a recent meeting of the board of directors. Mr. Morrill will continue as president of Hubbard and Company in addition to his new duties.

Mr. Wenner started his career in the electrical industry with Central Illinois Public Service Co. Thirty-two years ago he joined Kearney in the sales department. After various assignments he was made president of James R. Kearney Corporation of Canada in Guelph, Ontario. In 1959 he became president of Kearney.

Mr. Morrill was general manager of the Evansville, Ind., operation of Bendix-Westinghouse Automotive Air Brake Company prior to joining Hubbard in 1959.

D. E. Clisbee has been named acting manager of the Gulf Coast District of Graybar Electric Co., Inc., it was announced recently by the company's president, **W. E. Henges.**

Mr. Clisbee, whose appointment will become effective January 1, will replace the present district manager, **V. R. Young,** who will retire.

Most recently Gulf Coast district sales manager, Mr. Clisbee began his Graybar career as an elevator operator at Chicago, later serving in various positions in the warehouse there. In 1941, Mr. Clisbee was appointed service and disbursing clerk at Hammond, Ind., and in 1947, a salesman there. He was promoted to Hammond manager in 1953.

In 1958, Mr. Clisbee came to Gray-

D. E. Clisbee

CONFORMABILITY

The "SCOTCH" Brand Electrical Tape No. 33 used to wrap this high voltage termination conforms perfectly to its difficult cone shape. Provides a permanent shield of protection against wind and weather, at a minimum cost. Helps assure consistent trouble-free performance. When tape costs so little can you afford less than the best?

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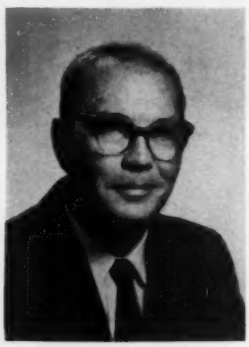
bar's New York national headquarters as general commercial sales manager. He held that position for one year before he was appointed Gulf Coast district sales manager, with headquarters in Houston, Texas.

Ernest T. H. Bowen has been appointed sales representative in North and South Carolina for the Progress Manufacturing Co., Philadelphia, Pa., it was announced recently by **Will Turner**, vice-president in charge of marketing.

Mr. Bowen formerly practiced architecture in Tampa, Fla., where he was a principal in the firm of Pullara, Bowen, and Watson. He



Ernest T. H. Bowen

holds an architecture degree from the University of Florida.

His territory includes all of South Carolina with the exception of Aiken, and all of North Carolina excluding Elizabeth City and Leakesville. Mr. Bowen's headquarters will be in Charlotte, N. C.

Justin Neuhoff recently was appointed manager of engineering for General Electric's high voltage switchgear department, Philadelphia, **Donald L. Beeman**, the department's general manager, announced.

Before taking over his present duties, Mr. Neuhoff was manager of power plant design at G.E.'s aircraft nuclear propulsion department. Mr. Neuhoff was manager of engineering for the commercial and industrial air-conditioning department from 1951 to 1958. He joined General Electric in 1950 as manager for development engineering at the air-conditioning department.

He received his ME degree from Stevens Institute of Technology, Hoboken, N. J., in 1937. He is also a graduate of the American Managers Association advanced management course.

Appointment of **Gordon W. Clothier** to the new post of manager of transformer planning has been announced by the Allis-Chalmers Power Equipment Div.

Mr. Clothier had been manager of the motor and generator department at the West Allis Works since 1956. Prior to that he had been manager of the transformer department for nine years.

He was an instructor in electrical engineering at the University of Washington before joining Allis-Chalmers in 1935. He was also an engineer in the transformer section and engineer in charge of transformer sales before becoming manager of the transformer department in 1947.

He is a graduate electrical engineer of the University of Washington.

S. E. Ratcliffe and **George F. Duborg** were elected vice-presidents of the Virginia Electric and Power Company in recent action by the board of directors.

Mr. Ratcliffe, who previously held the position of treasurer, will retain that position along with his new duties as vice-president. Mr. Duborg, Blue Ridge district manager, was named vice-president of Vepco's Western Division with headquarters at Charlottesville, Va. He will replace **Ray C. Hopkins**, who is retiring.

The board also made the following appointments in the accounting department: **G. A. Spencer** and **C. R. Goode, Jr.**, assistant treasurers, and **R. W. Briggs**, director of auditing and procedures, were appointed assistant comptrollers. **G. G. Dykes**, supervisor of tax and statistics, was appointed assistant treasurer.

Mr. Ratcliffe joined the Connecticut Power Company in 1917, later serving with Engineers Public Service Company as assistant treasurer of the main company as well as its subsidiaries, including Vepco. Upon the disolution of the Engineers company in 1947, he was named assistant treasurer of Vepco, becoming treasurer in 1953.

Mr. Duborg began his utility career with Stone and Webster, Inc., in Boston. He later served with other utilities before joining Engineers Public Service Company in 1935. He was named Vepco manager at Norfolk in 1952, and came to the Charlottesville post in 1955.

Harry H. Martin, former director of purchases and transportation for Sylvania Electric Products, Inc., has been appointed to the position of vice-president of operations by Triangle Conduit & Cable Co., Inc.'s president and chief executive officer, **Carl S. Menger**.

Mr. Martin studied electrical engineering at Drexel Institute of Technology in Philadelphia, and has had extensive executive experience in the purchasing and manufacturing fields. Before joining Sylvania, he was associated with Radio Corporation of America in Camden, N. J.,

and later was with H. H. Brown Co., Worcester, Mass.

He joined Sylvania in 1948 as purchasing agent for its subsidiary, Colonial Radio Corp., in Buffalo, N. Y., and was general manufacturing manager in charge of all purchases and production for the Sylvania Home Electronics Division in early 1960 when he was named director of purchases with headquarters in New York City.

The selection of **William D. Hamel** as manager of distributor sales for Jefferson Electric Co., Bellwood, Ill., was announced recently by **Bertrand J. Farrell,** general sales manager.

Formerly sales manager of the New England district, Mr. Hamel has spent the past nine years with Jefferson.

Mr. Hamel's work in electrical sales and distribution dates back to 1945, when he was employed by the

William D. Hamel

U. S. Rubber Company Wire and Cable Div.

He received additional experience in distributor sales with H. Young, Jr., Inc., Cambridge, Mass. He is a 1941 graduate of Boston University.

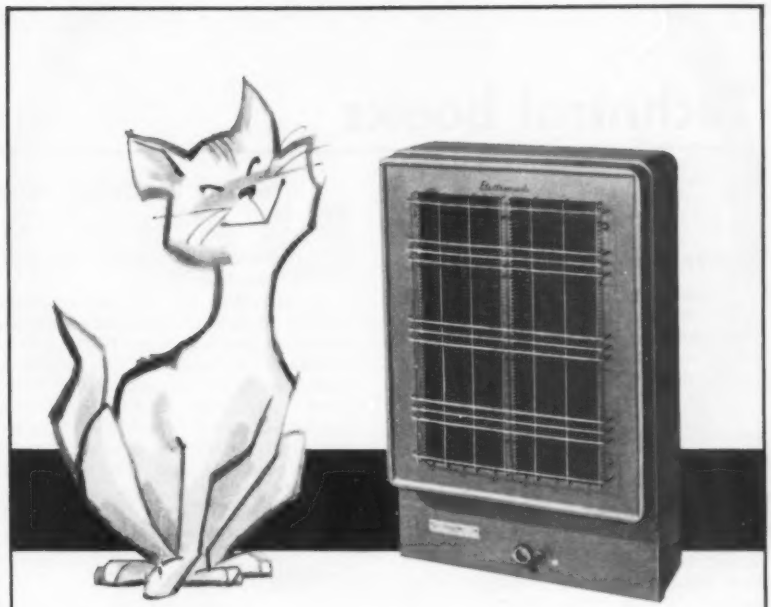
Charles D. Lyon, vice-president of marketing and public relations of the Potomac Edison Co., Hagerstown, Md., was recently elected president of the Public Utilities Association of the Virginias for 1962.

G. South Dunn was named first vice-president, and **Miles Cary** was elected second vice-president.

Mr. Dunn is director of public relations for the Appalachian Power Co., Roanoke, Va., while Mr. Cary is vice-president of the Virginia Electric and Power Co., Richmond.

Briegel Method Tool Company of Galva, Ill., has announced a revision of sales territories.

Dale Theesfeld will be Eastern division sales manager, while **H. J. "Hoogie" Hoogerwerf** will be Western division sales manager—responsible for the territory west of the Mississippi River.



a cat's 9 lives . . . and *Electromode* Heaters

Point up the contrast between a myth and a fact. It's a myth to assume little difference in various makes of electric heaters. It's a fact that today's ELECTROMODE Flameless Electric Heaters provide total heating efficiency throughout *one exceptionally long* and trouble-free life. Underlining this fact are two words: CAST ALUMINUM.

This is the long-life key. Electromode's exclusive Safety Grid. Only Electromode has it. All heating elements are solidly embedded in CAST ALUMINUM, forever safe, multiplying their service life many times—and assuring positive protection against fire, shock or burn. CAST ALUMINUM makes the world of difference! That's why, when you recommend the best in electric heaters—you have a mighty solid point in recommending Electromode. Write today for free literature on the world's most complete line of flameless electric heaters:

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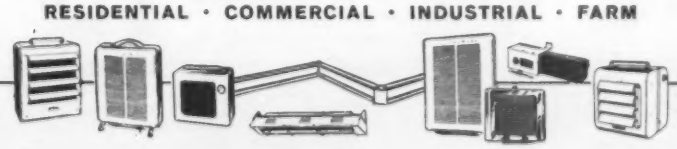

For more details on above items, use reply card on page 17

Technical books

for the electrical man

Electronic circuits

"Basic Electronics Series: Oscillator Circuits," by Thomas M. Adams. Published by Howard W. Sams and Co., Inc., 1720 E. 38th St., Indianapolis 6, Ind., 128 pages, $2.95.

Far from being another rehash of textbook circuit theory, this book incorporates a dynamic new approach to the explanation of electronic circuit actions.

Unique four-color diagrams are utilized in conjunction with simple, straight-forward explanations to help the reader actually visualize the actions which take place in nine basic oscillator circuits.

This unique approach should contribute markedly toward furthering the understanding of electronic circuit operations. The material has been prepared so it can be used for home or classroom study, for employee training programs, or for refresher reading, by anyone interested in electronic circuits.

In addition to an introductory chapter of fundamentals of electronic circuit operation, the book covers crystal oscillators, the Hartley oscillator, the Colpitts oscillator, tuneplate and tuned-grid oscillators, electron-coupled oscillators, the phase-shift oscillator, blocking oscillators, multivibrators, and thyratron sawtooth generators.

Consulting practice

"The Consulting Engineer," by C. Maxwell Stanley. Published by John Wiley and Sons, Inc., 440 Park Ave., S., New York 16, N. Y., 258 pages, $5.95.

Because engineers must also cope with management and professional problems, this book is devoted exclusively to these aspects of a consulting engineer's practice.

The book first explores the consulting engineer's professional relationships to his client, to other companies, and to the public. It then plunges into the internal problems of a consulting practice, discussing the many areas of organization, personnel, plant facilities, procedures, and management with which the consulting engineer is engaged.

Other common problems to the consulting engineer which are covered in the book include how fees are decided, how to select his staff, how to meet the competition, the benefits of publicity, whether to join professional organizations, and the approach to advertising.

Also included are discussions on tax angles, labor benefits, whether a partnership is superior to a corporation, and how to balance a budget.

The author, C. Maxwell Stanley, is senior partner and general manager of the Stanley Engineering Co.

Electrician's reference

"American Electricians' Handbook, A Reference Book for Practical Electrical Workers." Eighth Edition, by Clifford C. Carr. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N.Y., 1,676 pages. 1620 illustrations, $17.50.

This book is a comprehensive reference for practical electrical workers—be they engineers, electricians, linemen, operators, or superintendents—who deal with the design, installation, and maintenance of electrical installations and equipment.

The compilation of helpful information on electrical equipment and materials is presented without the use of advanced mathematics and arranged to be as useful as possible for the intelligent selection, installation, maintenance, and operation of electrical equipment.

All sections of the new edition have been carefully revised to present up-to-date information for the selection and use of electrical conductors, switchgear, panelboards, protective devices, wiring materials, capacitors, batteries, rectifiers, transformers, generators, motors, lamps, and lighting fixtures.

Completely in accordance with the 1959 National Electric Code, the book covers modern methods for the distribution and use of electrical energy, both interior and exterior installations. Nearly all illustrations have been replaced in the new edition.

Clifford C. Carr, formerly assistant dean of Pratt Institute's engineering school, has been editor of the "American Electricians' Handbook" since the third edition was published in 1932. A graduate of the Rensselaer Polytechnic Institute, he has had 41 years of experience in both the teaching of electrical engineering and

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FAMILY OF QUALITY ELECTRICAL FITTINGS
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Two more excellent reasons why it's good business to rely on Rattan quality in every job. Rattan is THE line designed to get the job done better — more economically. Insist on Rattan in your work!
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technology and the design and selection of electrical equipment for electrical installations.

Problems in contracting

"Electrical Contracting," by Ray Ashley. Published by McGraw-Hill Book Co., Inc., 327 W. 41st St., New York 36, N. Y., 294 pages, 54 illustrations, $10.00.

A companion volume to the author's "Electrical Estimating," "Electrical Contracting" is written in a practical style.

The book provides comprehensive treatment of contracting problems from the initiating of the business to its continuance from year to year. Additional margins of markup, gains by selecting better contracts, reducing labor cost by good management, obtaining new customers, and many other benefits are subjects of this book. There is extensive data on overhead cost studies, heretofore unavailable, and coverage of numerous management problems.

Among the problems covered in "Electrical Contracting" are how a man contemplating the electrical contracting business can appraise his own qualifications; how much it will cost to get started in the business; how much it will cost to maintain the business until it is self-supporting; how much business will have to be forthcoming to warrant continued operation; the manpower problem; the necessary functions of a well qualified contractor; how to select the better contracts; and how to make the most of contracts obtained.

Ray Ashley is a business and estimating consultant who, for the past 25 years, has been engaged in all phases of electrical construction work. He is the author of over 100 feature articles on electrical estimating and construction. Mr. Ashley has also served as business consultant to electrical contractors, has conducted forums for electrical contractors' associations in many large cities, and has lectured before engineers and contractors all over the country.

Basic table handbook

"Trig, Log, Antilog, and Log of Trig Functions Six-place Tables." Published by Ottenheimer Publishers, Inc., 4805 Nelson Ave., Baltimore 15, Md., 192 pages, 2-5/8 by 5-5/8 inches, $1.00.

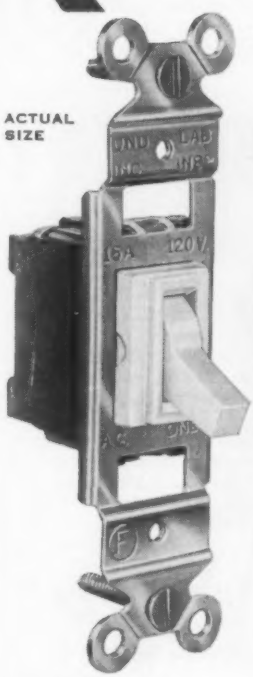
All the tables listed in the title are in this compact vest-pocket library book.

In addition to the tables, there are eight pages of formulas, eight pages of interpolation, and other pages of valuable information. All the tables are carried out to at least six places.

An index is included in the handbook.

QUIET

ACTUAL SIZE



new

NO-KLIK Junior™

Circle F — with precise engineering design — and without mercury or other fluids — offers the No-Klik Junior, a rugged dependable and Q-U-I-E-T wall switch.

CHECK THESE FEATURES
Raised Cover Frame Fits Snugly Into Plate for dust free operation • Large Silver Alloy Contacts for dependable duty • Fully Enclosed in Bakelite for safe, lasting performance • New Low Price for added profits

Another fine product of Circle F know-how

GUARANTEED F WIRING DEVICES

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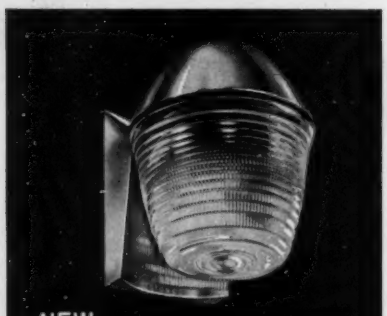
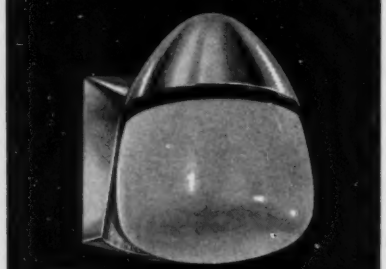


NEW . . . prismatic luminaire



NEW . . . . . opal series

NEW . . . . . bullet beauty

NEW . . . . underwater lights

WRITE FOR CATALOG S-61

STONCO lighting

STONCO ELECTRIC PRODUCTS CO.

333 MONROE AVE., KENILWORTH, N.J.

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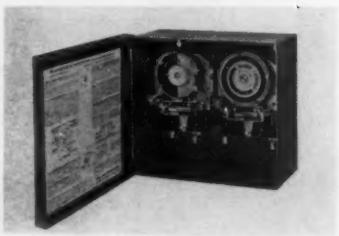
New products

Tork outdoor time controls

A new astronomic time control is being marketed to supermarkets and shopping centers by Tork Time Controls, Inc., Mt. Vernon, N. Y.

Called the model S-180, for the automatic on/off control of store and parking lot lighting, it is designed to effect a great savings in light consumption.

It is one of the first astronomic time controls that will turn lighting off at any hour. The S-180 now permits for lighting to go off exactly when a store closes, saving at least one hour or more of current use each day.



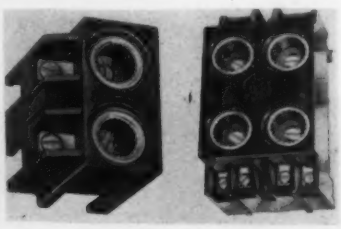
The automatic off-time can also be programmed on a varied schedule, to conform with any daily change in closing hours. The unit is a completely mechanical control and is not affected by external lighting conditions.

Write P-1117 on reply card, p. 17

Arrow-Hart fuse block

The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford, Conn., has developed type S components which are factory-installed in its two-circuit and four-circuit plug fuse blocks for 100- and 200- ampere add-on service equipment. These new components cannot be removed by homeowners and they permit the insertion of 15-ampere type S fuses only, thereby positively preventing overfusing of circuits and assuring compliance with Code requirements wherever those requirements make this protection mandatory.

The components are designed to extend the range of applications for 100- and 200-ampere add-on service equipment and provide an important added safety feature. Contractors can thus meet a greater variety of installation requirements, and distributor inventories are reduced.



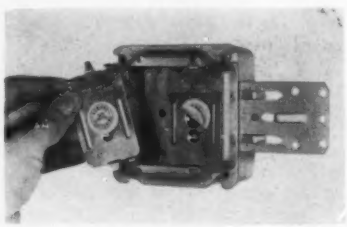
Write P-1118 on reply card, p. 17

Appleton outlet protector

An outlet protector cover and locator which allows wall plastering to completely cover outlets with no damage or inconvenience is available from Appleton Electric Co., 1701-1759 Wellington Ave., Chicago 13, Ill.

The outlet protector cover installs in seconds and fits all standard three by two switch boxes and industry standard outlet box covers. It is economical, yet saves many dollars in labor costs.

The new outlet protector snaps into outlet covers or switch boxes, keeping them clean and fully protected while plastering. Because of its unique design, wires can be inserted into raceways and boxes before plastering. Later, when plaster has dried, a spot of color appears—indicating the exact location of every hidden outlet without fail; there are no lost outlets to worry about.



When plaster is pushed in at the colored spot, the outlet opening is left sharp and clean, screw holes are left clean, and wires are protected.

Write P-1119 on reply card, p. 17

Hubbell locking switch

A switch locking cover attachment with a Yale tumbler lock, which assures positive control of electrical switches, has been announced by the Harvey Hubbell Co., Inc., P. O. Box H, Barnum Sta., Bridgeport 2, Conn,

Designed for institutions as well as home workshops, this new safety device for switches fits over any metal wall plate, whether single or ganged. It also eliminates the possibility of unauthorized persons tampering with the switch. It is available in master keying and straight keying systems.

This attachment can be quickly and easily installed over an existing flush toggle switch, except the interchangeable type, without any change in wiring. After screws from the existing plate are removed and discarded, the locking cover attachment is positioned over the plate and attached with the two brass-plated steel screws supplied with the device. Then the cover is snapped into place and the key given a quarter turn to lock.

A recessed pin which hinges the locking attachment to its back plate is concealed and cannot be knocked out when lifting the cover.

Write P-1120 on reply card, p. 17

Plymouth tape dispenser

The Flip-N-Cut instant dispenser-cutter for Slipknot plastic electrical tape is now available in three sizes from Plymouth Rubber Co., Inc., Canton, Mass.

When the original Flip-N-Cut dispenser was introduced last year, the only size available was the 66-foot by ¾-inch roll, generally accepted as the standard professional size. Plymouth has now added a 44-foot

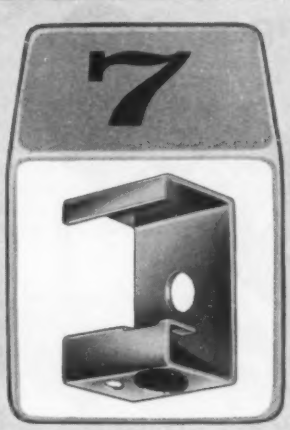
and a 30-foot roll, each packed in a smaller size, but otherwise identical, Flip-N-Cut plastic dispenser, with no additional cost for the dispenser.

Write P-1121 on reply card, p. 17

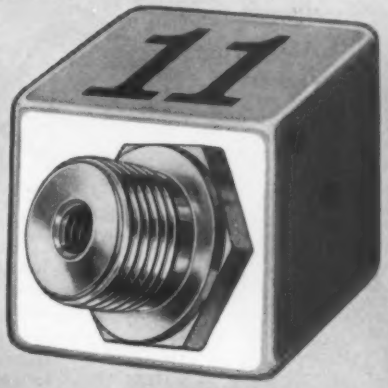
Kurtzon wood framed fixtures

Contemporary design is emphasized in the walnut framed, large sized ceiling fixtures being introduced currently by Morris Kurtzon, Inc., 1420-30 S. Talman, Chicago 8, Ill.

Created to make available the



TOMIC 707 SNAP-ON LATHING CHANNEL CLIP. Snaps easily onto lathing channels up to 1½" (or ½" pipe) for mounting flush, surface or stem fixtures from suspended ceilings. No tools required! Threaded to accommodate ⅜" pipe and ¼" or ⅜" rod which locks clip securely to channel.



TOMIC 711 ADAPTA-STUD. Quickly, easily installed, Tomic Adapta-Studs simplify conversion from rod to stud size to complete the job in seconds!

or 20

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For more details on above items, use reply card on page 17

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quality and dignity inherent in fine woods to architects and interior designers who have wanted modern, wood framed ceiling units, the new Kurtzon fixtures, because of their simplicity, will harmonize with a wide variety of furniture styles.

Four basic molding patterns are available in three basic sizes—from approximately two feet square to four feet square.

Larger sizes and specially designed shapes may be ordered on an individual basis. The number of lamps per unit can be varied to meet special needs.

Write P-1122 on reply card, p. 17

Rodale safety switch cover

Modern design is combined with tough neoprene material in a completely weather resistant touch switch plate cover available from Rodale Manufacturing Co., Inc., 6th and Minor Sts., Emmaus, Pa. This cover

can be used with the Rodale line of Touchette switches or any touch type switch.

The rugged neoprene will repel live steam, extreme cold, grease, oil, and hot water. Complete outdoor and industrial protection is now economically offered for standard wall box or FS mounting.

The new material allows safe usage in carports, shipping areas, schools, hospitals, gas stations, golf stations, golf ranges, playgrounds, breezeways, marinas, etc.

Write P-1123 on reply card, p. 17

Square D pilot light kit

A new kit for easy field installation of a pilot light to the size 00 starter in a general purpose enclosure has been introduced by Square D Co., Dept. SA, 4041 N. Michigan Ave., Chicago 11, Ill.

Available in three voltage ratings, 110, 208/220, and 440/550 volts, the new pilot light kits can be used on any frequency from 25 to 60 cycles.

All general purpose enclosures for Square D size 00 starters are furnished with a knockout in the cover. A two-piece lens designed for maximum light diffusion is snapped into

the knockout. The socket and bulb assembly mounts conveniently to the top coil terminal.

Each pilot light kit contains the socket and resistor assembly, lens and lens cover, a neon bulb, power lead, and complete mounting instructions.

Write P-1124 on reply card, p. 17

Lightguard streetlight unit

An automatic plug-in streetlight control, the Dialatrol, by Lightguard Electronic Manufacturing Co., Inc., 1213 St. Emanuel St., Houston 3, Texas, provides for simple screwdriver adjustment of the operating light level desired in the field without removing the control from its receptacle.

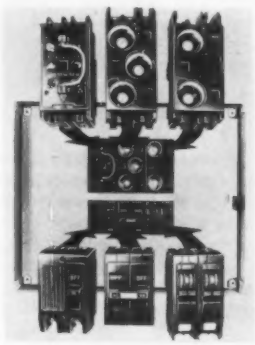
It is possible to change the light operating level at dusk from ½ to three footcandles and to read the footcandle setting in the light-admitting window. The control also permits simple regulation of the length of period of illumination.

The device provides Varistor surge-protection.

Write P-1125 on reply card, p. 17

G-E breaker/fuse panels

New 4-in-1 breaker/fuse panels now available from General Electric Co., 1 River Rd., Schenectady 5, N. Y., provide one of the first developments of a service entrance enclosure which accepts both plug-in circuit breakers and plug-in fusible units.



The unique 4-in-1 line makes it possible to install both breakers and new G-E plug-in fuse blocks in the same panel. In addition, each new breaker/fuse panel has dual mounting provision and is shipped from the factory ready for either flush or surface installation.

Selection also is easier. Only 29 panels cover the full range of service entrance requirements from 100 to 200 amperes; 12 to 40 circuits; flush, surface, or raintight; circuit breaker or fusible.

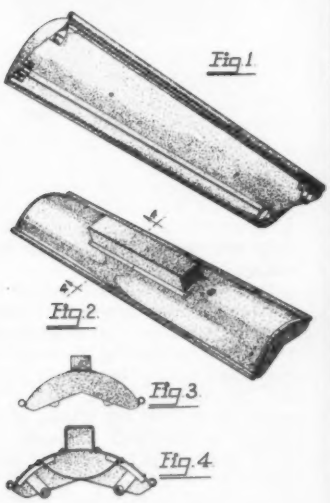
Headlining the breaker/fuse line are new plug-in fuse blocks. These units offer the plug-in versatility of circuit breakers and the additional advantage of interchangeability with breakers in the same panel.

Pullers are available in 30- and 60-ampere ratings for both main and branch circuit protection. For separately metered water heater applications, pullers with isolated line connections are also available in the same ratings.

Two units are offered for 15- to 30-ampere plug fuse circuits. One unit (Cat. No. TRC2) has space for two plug fuses; a second unit (Cat. No. TRC3) has space for three.

Write P-1126 on reply card, p. 17

TRADE NOTICE



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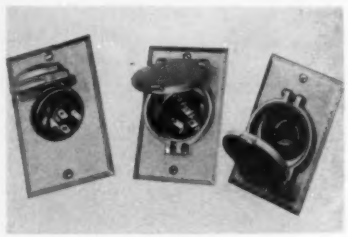
Perfect-Line receptacles

A high-safety, weatherproof power receptacle series for mobile-home trailers and all portable equipment has been introduced by the Perfect-Line Manufacturing Corp., Old Country Rd., Hicksville, N. Y.

Featuring a recessed, grounding type or twist-lock terminal, as required, the unit accepts standard power extension cords supplied by trailer parks. This rugged, weatherproof motor base assembly is made in three styles: fixed-position type with



spring operated snap-cap, a swivel-collared unit with snap-cap, and a swivel-collared type with twist-lock receptacle and snap-cap.

The swivel collar permits the snap-cap to be positioned and locked in place anywhere around a full circle for easier use in certain applications.

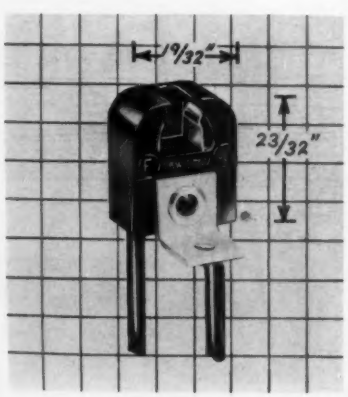
The assembly series features a U.L.-listed back-wired receptacle for 20- or 30-ampere use, a stainless steel or baked aluminum-finished brass plate, a stainless steel hinge-spring, and a self-sealing die-cast aluminum cap. A neoprene gasket, mounting strap, and mounting screws are supplied.

Write P-1127 on reply card, p. 17

Circle F bi-pin lampholder

A miniature bi-pin lampholder for T-5 fluorescent lamps is available from Circle F Manufacturing Co., 720 Monmouth St., Trenton, N. J.

This small lampholder has been engineered for four-, six-, eight-, and 13-watt lamps and measures 23/32 inches high by ⅜ inches deep by 19/32 inches wide.



The lampholder is furnished with six-inch No. 18 AWG 105 C AWM plastic wire leads, but other lengths and wire types are available on request. The brackets are tapped for No. 6-32 mounting screws, allowing them to be quickly mounted in the smallest possible space with a single screw.

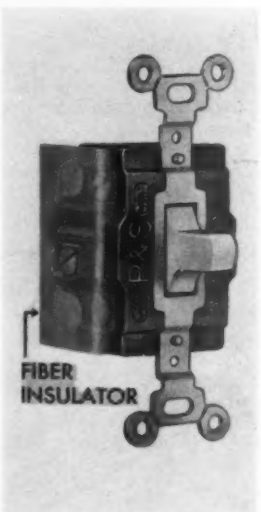
Completely interchangeable, the Circle F mounting method permits the use of many brackets when flush and surface mounting is desired or as butt-on mounting without brackets.

The bi-pin fluorescent lampholder is available in either black or white and is rated 75 watts, 250 volts.

Write P-1128 on reply card, p. 17

Pass & Seymour a-c switch

Designed primarily for air conditioning and heating installations, the new maintained contact a-c switches made by Pass & Seymour, Inc., Solvay Station, Syracuse 9, N. Y., can also be used for the alternate control of any two motors, or for any applications which require heavy



duty a-c double throw, center "off" switch controls.

The "off" position is at the center of the handle throw with the two circuits energized at either end.

A fiber insulating wrap-around is assembled under the switch cover and can be folded down over the terminals to protect the wiring when the switch is installed in small enclosures. Control is either by a standard toggle or a lock type handle; both fit openings in standard wall plates.

The switches are available in single- or double-pole models, each with a brown, ivory, or lock type handle. Single-gang ivory Uniline and .040-inch brush brass wall plates with suitable marking are provided for air conditioning installations.

Write P-1129 on reply card, p. 17

Helpful literature

A new line of **fire pump controllers,** listed by U.L., and Factory Mutual, is described in an eight-page booklet, No. LJ-25, available from **Cutler-Hammer, Inc.,** 233 N. 12th St., Milwaukee 1, Wis. It includes a list of various considerations that must be examined before selecting proper fire pump protective equipment for each individual application.
Write B-1130 on reply card, p. 17

A new series of four bulletins describing **outdoor lighting transformers** and their applications is available from **Jefferson Electric Co.,** 910 S. 25th St., Bellwood, Ill. Describing transformers for outdoor incandescent and outdoor mercury vapor lighting, the 20-page series includes brochures on mercury vapor lamp transformers and on transformers for series circuit incandescent lighting.
Write B-1131 on reply card, p. 17

A new 64-page, two-color catalog entitled "Walkerduct Systems" is offered by **Walker Bros.,** Conshohocken, Pa. The catalog, No. 761, presents information, illustrations, and dimensional drawings on **underfloor duct systems** and parts.
Write B-1132 on reply card, p. 17

A fluorescent lamp **ballast buyer's guide,** ATC-112, has been released from **Advance Transformer Co.,** 2950 N. Western Ave., Chicago 18, Ill. This publication covers the company's complete line of ballasts, with wiring diagrams, prices, specifications, and descriptive data included.
Write B-1133 on reply card, p. 17

A new 1960-61 catalog of "service guaranteed" ballasts has been published by the **Universal Manufacturing Corp.,** 29-51 E. Sixth St., Paterson N. J. This 32-page edition contains a dual listing by lamp type and catalog number of Universal's full, regular line of **fluorescent ballasts** for indoor and outdoor applications. All ballasts CBM certified by ETL are indicated. New features of the catalog include wiring diagrams and lead lengths, plus thumb-indexed pages.
Write B-1134 on reply card, p. 17

"Engineered **Lighting and Control Equipment** for Open Stage Theatres," catalog No. 102, published by **Hub Electric Co., Inc.,** 2249 W. Grand Ave., Chicago 12, Ill., contains recommendations, illustrations, and schedules for basic equipment suitable for school and community use.
Write B-1135 on reply card, p. 17

Recent developments in **electrically operated switches** are covered in bulletin No. S-123, from **Pringle Electrical Manufacturing Co.,** 1900 N. 6th

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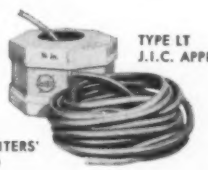

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(November, 1961)

St., Philadelphia 22, Pa. This illustrated folder explains details of mechanisms, operations, uses, and safety features.

Write B-1136 on reply card, p. 17

Wiring diagrams for automatic control of mechanically held contactors and of low-voltage relays are featured in a new bulletin, No. 80, from **Tork Time Controls, Inc.,** 1 Grove St., Mt. Vernon, N. Y. The bulletin describes uses and applications of the new momentary contact time switches.

Write B-1137 on reply card, p. 17

Electric **infrared radiant heat** is explained in a new four-page, two-color brochure containing application illustrations for both indoors and out, now available from **Fostoria Corp.,** Dept. 103, 1200 N. Main St., Fostoria, Ohio.

Write B-1138 on reply card, p. 17

Yoke-suspended bucket

(Continued from page 67)

For operational stability, the MV-50 is fitted with a rear center-mounted jack and either diagonal slide-out or fold-over type outrigger jacks.

Master hydraulic controls are conveniently located on the edge of the bucket, slave actuated main control valves are mounted in the superstructure.

Well-equipped house

(Continued from page 30)

and trophy room. There is an 80-gallon circulating water tank nearby.

This area is illuminated by fluorescent fixtures with two eight-foot slimline tubes for each fixture. Two through-the-wall circulating fans, each powered by 1/6-hp motors, are installed in the swimming pool room to carry off excess moisture.

A guest room with bath and a two-room bomb shelter are also located in the basement. The bomb shelter has a 20-inch reinforced concrete ceiling and 12-inch walls of the same material. The shelter is completely equipped with its own electric stove, oven, refrigerator, and exhaust fans.

Looking over the surface control panels in the garage gives an indication as to how the house is wired. Panel "A" provides circuits to the air filter and fan motors of the air conditioning and heating circulating system for the north side of the house, and for the two-room bomb shelter.

It also serves the washer and dryer and lighting throughout the west side basement area, including the guest bedroom and bath.

Panel "B" serves the east wing of the upper level and its two bedrooms and adjoining bathroom, and the east side of the living room. Panel "C" takes care of the west side of the upper level, which includes the master bedroom, its bathroom and part of the hallway, and the attic.

The other circulating air system and filter for one of the five-ton heat pumps is located in the attic.

The kitchen area, dining room, and west side of the living room and the dining room are wired to panel "D." Panel "F" provides circuits for outdoor and garden lighting, the circulating pump for the indoor swimming pool, the two circulating exhaust fans near the pool, and operates another 1/6-hp motor for the garage door.

Also wired to this panel are pumps for the outside lawn sprinkler system which works automatically from a time switch. Floodlights are situated completely around the house mounted just under the eaves, and two post lights, one in front and one in back, operate from a photoelectric cell type switch.

As to the over-all cost of the home, Mr. Davis just says, "I stopped counting it up a long time ago."

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OPEN-TOP WIRING — ready for immediate wiring — speedy and easy installation without removal of the interior mechanism. DUST-PROOF (Completely enclosed) INTERIORS with extra large binding head screws that are backed out and staked. Replaceable interior gives absolute satisfaction on full rated loads with performance that far exceeds Underwriters' Standards. Porcelain Receptacles No. 1736 and 1924 are pull-chain, three piece with shadeholder groove. For 3¼" or 4" box.
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Voltage regulator

(Continued from page 68)

the induction regulator, the voltage control element is a static control which uses all solid-state components with no moving parts or contacts.

Unoreg smoothly corrects the input voltage without jumps or time delay by inducing a voltage in the series coils of the induction regulator which either adds to or subtracts from the input voltage.

Automatic load transfer

(Continued from page 66)

eliminates the hazards of open equipment.

Automatic switching is achieved by a type S, single-phase sensing load transfer device controlling the operation of the oil switches. Fuses were installed on the load side of the transfer equipment on one of

the installations to protect the primary system from faults on the load side.

On the other installation a relay scheme utilizing current transformers was used to block transfer and protect the primary system from faults on the load side.

The electrical department is planning additional similar installations because enclosed automatic primary switching provides reliability practically equivalent to network service at reduced cost.

Overhead rack

(Continued from page 65)

by 1,000 MCM copper straight line strain clamps.

Although many advantages resulted from the above installation, the Houston Lighting & Power Company's standard transformer rack design was changed very little. The principal change consisted of applying new equipment to already established practices to obtain a neater, less expensive, and more nearly maintenance-free installation.

IBM equipment

(Continued from page 64)

major and minor materials produced by the IBM equipment from the sketch. Major material is shown in Figure 3 according to accounts and minor material on a sheet not included here. These sheets are used by the stores department in loading the truck and by the crews for keeping track of materials used.

Figure 4 shows the complete estimate made from the same sketch, No. 3996, by the data processing equipment.

Voltage control system

(Continued from page 61)

factory and economical tool for solving the voltage regulation problem in these remote areas.

The regulator, coupled with line type capacitors in many cases, allows useful line capacity to be increased to two to four times its former capacity on circuits that are voltage-limited. These pole type regulators also permit the use of tapless transformers, resulting in a ten per cent savings in transformer first costs and eliminating the confusion of tap changing programs and misapplications that usually result.

In general, the power factor on peak is maintained at approximately 93 per cent by installation of fixed capacitors. The first line regulator is installed out on the circuit when the over-all voltage drop exceeds five per cent. This installation is located at the center of the line drop as shown on a voltage profile of the line. Following the installation of the first regulator, the capacity of the line is doubled unless it becomes current limited.

The combination of the line regulator and selective seasonal switching of capacitors permits satisfactory voltage control without the use of automatic capacitor controls except in unusual cases involving large intermittent blocks of load. The combination of power factor correction capacitors and a single regulator result in circuit capacity approximating 300 per cent of the uncorrected circuit capability.

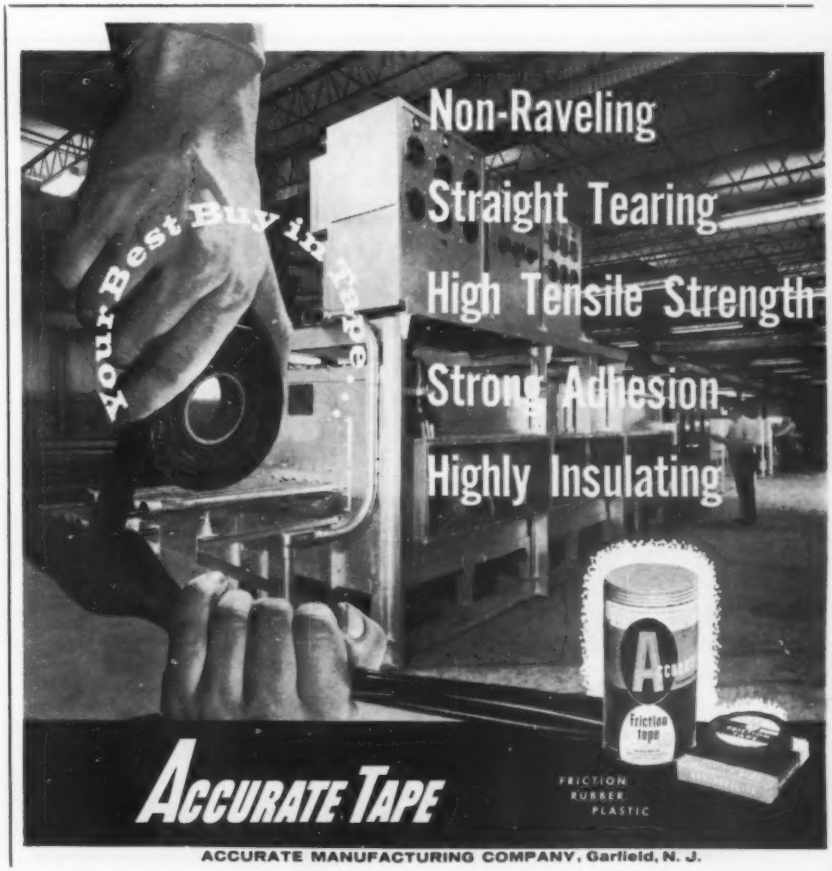
A second regulator and additional capacitors often allow circuit loading up to 450 per cent uncorrected circuit capability but involve relocation of the first regulator. Final location of these two line regulators would then be at the 1/3 and 2/3 points on the voltage drop profile. Although this involves moving the first regulator, economic considerations usually justify this procedure.

In sizing the regulators, a rating commensurate with the normal and practical circuit loading at the point of application is usually selected. This eliminates the problem of overload and change-out of regulators that could be brought about with increased circuit loading.

It also results in stocking only three sizes—50-ampere, 100-ampere, and 150-ampere—to go with the No. 4 ACSR, 1/0 ACSR, and 336.4 MCM ACSR conductors that are standard with Louisiana Power & Light Co. These rating selections take into account the usual distribution of load ahead of the regulator and the 165 per cent "bonus" rating attendant with five per cent range.

Most of the line type regulators in Louisiana Power & Light Company are installed on regular line poles. Three consecutive poles are usually employed for each of the three installations of a three-phase circuit.

This type of mounting minimizes



ACCURATE MANUFACTURING COMPANY, Garfield, N. J.

For more details on above items, use reply card on page 17

the amount of installation cost and obviates the necessity of site procurement that is often involved with group or three-phase regulator installations. Figure 5 depicts an installation of this nature.

Code application

(Continued from page 37)

areas, this would be a more easily understood reference. However, the only reference to such areas in Article 511 is that made in Section 511-2 which merely states in Paragraph (d) that areas similar to these shall not be classed as hazardous.

Therefore, at least in commercial garages, it can be safely assumed that any wiring listed in Chapter 3 would be acceptable in the areas classed as non-hazardous. (How a lubritorium where gasoline-driven vehicles are serviced can be classed in the same category with office areas is another question.)

However, in the case of service stations, Section 514-4 specifically states, "Wiring and equipment not within hazardous areas defined in Section 514-2 shall conform to Sections 511-5 and 511-6." Sections 511-5 and 511-6 govern wiring and equipment respectively *above* hazardous areas in commercial garages. The wiring, by the provisions of Section 511-5, must be metal raceways or type MI cable.

Yet, the fact remains that the *intent* of Section 514-4 was to require that wiring and equipment which is installed *above the hazardous areas* as defined in Section 514-2 conform to Sections 511-5 and 511-6.

If the reader will take the time to correct his copy of Section 514-4 accordingly he will then have the correct intent of this rule. For the sake of clarity, I will repeat this as follows:

Section 514-4 now states: "Wiring and Equipment not Within Hazardous Areas. Wiring and equipment not within hazardous areas defined in Section 514-2 shall conform to Sections 511-5 and 511-6."

For the intended meaning, correct this wording so that Section 514-4 will read, instead, as follows:

Wiring and Equipment Above the Hazardous Areas. Wiring and equipment above the hazardous areas defined in Section 514-2 shall conform to Sections 511-5 and 511-6.

Section 514-5 requires that each circuit leading to or through a dispensing island, whether for a pump or for a lighting standard, be provided with a switch of the type which will disconnect all of the circuit conductors, including the grounded neutral conductor where one is used.

(A 220-volt motor circuit, for instance, would not have a neutral conductor, but most circuits supplying islands do require neutral conductors.)

The requirement for opening the neutral as well as the hot conductors is to prevent an accidental arc at the island while work is being performed on the circuit or its equipment in the event that a neutral and a phase conductor had been transposed.

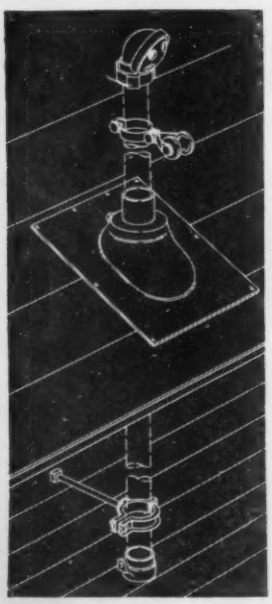
The neutral conductor should *not* be provided with an overcurrent device. The provision applies to a disconnecting means only. Special circuit breakers are made for this purpose which open the neutral as well as the phase conductors when the breakers are turned off. These special circuit breakers have over-current devices in each ungrounded conductor but not in the neutral.

Switches which open all conductors but which have no fuse in the neutral are suitable also for this purpose. In this case, overcurrent devices usually are provided ahead of such switches where needed and unfused switches are added for disconnection only.

In service stations, seals are required in all raceways passing through hazardous areas. If the raceway emerges from underground in a non-hazardous area, the seal should be at or as near as practicable to the point of emergence without any couplings, fittings, or other openings between the seal and the surface where the raceway emerges.

If the raceway emerges within a hazardous area and extends above it, the seal should be placed at or as near as practicable to a point 18 inches above grade with no couplings, fittings, or other openings between the seal and the point where the raceway leaves the hazardous area which is the 18-inch above-grade boundary.

If the raceway emerges in the island, the first fitting must be a seal. In addition—and this is according to the rule as it is literally stated or written—another seal is required in raceways extending above the four-foot hazardous



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boundary line at or as near as practicable to the four-foot level.

If a raceway can be turned up so that the end of the pipe for the first fitting comes up to the four-foot level, then one seal at this point would serve as both the first fitting and as the vertical boundary seal.

Actually, no harm could result if a seal should come below the four-foot level provided that there were no couplings, fittings, or other openings between the seal and the four-foot level. No such openings are permitted between any seal and the point where the raceway leaves the hazardous area anyway.

But the requirement here, as at any other boundary, is that the seal be at or as near as practicable to the point where the raceway leaves the area. What is peculiar, or at least unique with dispensing islands, is the additional requirement that the first fitting emerging from the island be a seal.

Nowhere else in the Code are threaded couplings and approved fittings prohibited except between the seal and the point where the raceway leaves the hazardous area. But on islands, such fittings are prohibited also between the seal and the point where the raceway emerges from the slab even though the areas below and above this point are both Class I, Division 1 locations.

A seal is required where a raceway enters and where it leaves a gasoline pump. This seal must be the first fitting as the raceway emerges from the slab also.

All metal raceways and the non-current-carrying metal parts of pumps and electrical equipment, regardless of voltage, are required by Section 514-7 to be effectively grounded in accordance with the applicable provisions of Article 250.

Answers to Code test questions: (1. **F** Section 513-1) (2. **T** Section 513-2-c) (3. **F** Section 513-5-b) (4. **T** Section 513-6-b) (5. **T** Section 513-10-c) (6. **b** Section 514-1) (7. **a** Section 514-2-a) (8. **a** Section 514-2-a) (9. **c** Section 514-5) (10. **c** Section 514-7).

Rural electric heat

(Continued from page 27)

This prospect had been operating his 580-unit breeding ranch with liquid petroleum gas, which had not proved completely effective in maintaining the necessary 72-degree temperature year-round.

Mr. Campbell sold electrical wall insert heating for the chinchilla breeding house and for the tenant house. For the owner's attractive rural home he sold baseboard heating. Air conditioning was also installed in the house and breeding structure.

The owner is so completely satisfied with electrical heating for farm and animal buildings that now he is planning to have electrical wall insert heating installed in his palomino barn.

Correct installation of electrical heating helps the contractor to make new sales. Mr. Campbell stresses the importance of good insulation, and always urges the customer to have his buildings well insulated. To reduce the cost of insulating and to insure efficient work, Mr. Campbell now offers the service himself. Insulation installation adds to his profits and produces a better, more economical job for the customer.

Mr. Campbell specializes in the installation of wood fiber insulation (Thermtron). He points out to the customer that four inches of this material, correctly applied to attic and sidewalls, equal six inches of fiberglass.

Some customers, including the chinchilla rancher, postpone the insulating job until after they have electrical heating installed.

But Mr. Campbell does not forget them. He keeps in touch, asks them about the monthly bills for electricity, and usually induces the customer to have insulation done eventually. The chinchilla rancher has already given the order for insulation for the breeding barn.

The insulation service is of particular value because this contractor is using aggressive measures to induce rural business people to install electrical heating.

Few homes or structures in rural areas are properly insulated, especially older buildings. Prospects for electrical heating and insulation are highway restaurants and inns, dine-and-dance places, skating rinks, motels, and numerous animal and fur farms.

Mr. Campbell has a 15-minute radio program, from 7:15 to 7:30 a.m., which tells the story of insulation and electrical heating. He also sponsors a Little League baseball team.

"There's still plenty of work to be done in selling electrical heat-

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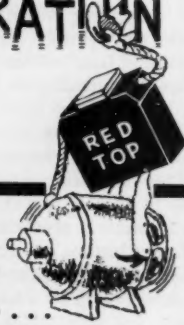

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ing," he admits. "My promotional job is a continuous one. I feel that sales work I do this year helps to swell next year's profits."

He personally follows up good leads with house calls, taking with him the advertising pieces supplied by the manufacturers of electrical heating equipment and insulation.

Besides promotion of electrical heating, Mr. Campbell has another specialty that he promotes profitably—outdoor lighting. He has done some of the most spectacular garden lighting in the city.

Proof that his work is valued by those who see the results is the fact that, in some neighborhoods of fine homes, several homeowners in a group have installed outdoor lighting by him.

Three trailers

(Continued from page 33)

more than 100 miles. A trucking company is hired to haul the trailer to the site and later to move it if that is necessary. "The cost is reasonable and we come out better than when we had to move shanties," Mr. Clark said.

On one of Dyer's larger jobs, a trailer remained at the job site two years. For smaller jobs, Dyer uses knock-down aluminum shanties which can be assembled in half an hour.

Accent lighting

(Continued from page 22)

that women are buying color, that styling has become the secondary consideration. We attribute this to the fact that women have reached an awareness that certain shades or hues are more becoming to them than others.

Again, certain shades "date" the garment. For women looking forward to buying accessories for their garment, matching to daylight illumination is without parallel.

Seeing what they are buying under daylight quality light has reduced the store's return merchandise appreciably.

Our accent lighting throughout the store has doubled our wattage. But now we are buying primary power from the electric company —bringing in the current via our own transformer, with secondary distribution throughout the store.

Our office area, with footcandle readings on desk tops varying from 75 through 90, uses the new 277-volt tubes.

Accent lighting has given our store a modern look we doubt could be achieved by any other means. It sets the tone and enhances the merchandise. It is the environmental pace setter.

One-stop supplier

(Continued from page 26)

electrical contracting ranks ourselves, we can determine if the job holds a profit for the contractor."

In this advisory capacity, such service can prevent a contractor from involuntary bankruptcy.

Mr. Leetzow feels that a contractor on his way up and planning to bid a major contract "may not know the entire picture of the job.

"If we're invited to discuss the job in family council fashion with our contractor customer and our engineers, we can pinpoint any danger that the contractor is facing."

As Mr. Braverman puts it: "If our conclusions are that the contractor is attempting more than he can accomplish, this should be pointed out to him on the principle that you can't throw a minor league player into major league ranks. Small contractors can do the small jobs. Big contractors have the organization for big jobs."

Mr. Braverman shies away from any joint venture with a contractor, preferring that the contractor go elsewhere in such cases to obtain his supplies.

On the other hand, the Bradenton store's personnel, ever on the alert to help a worried contractor locate some minor item on whose hunt he's wasting major time, will obtain the item in a hurry from its own stocks or from its allied outlets. Since such situations often occur for contractors, the store's willingness to diligently run down a $1 or $1,000 item enables contractors to give the firm such problems.

Mr. Braverman's justification for rendering such service, which may cost him money, is simply stated: "We have access to about every electrical line in the country. If the supplier lets a customer drive away miffed because he couldn't get the component he needed, he stands to lose out on a contract. If he falls by the wayside, his supplier falls with him."

Recognizing that today's lighting contractor must be a professional or have access to professional counseling in planning ex-

tensive lighting systems or exotic illumination, contractors appreciate Mr. Leetzow's cooperation.

In the case of a posh motel, Mr. Leetzow sparked an outdoor application to produce dramatic lighting of some parabaloid structures by suggesting planters be built around the base of the parabaloids.

A 15-watt colored fluorescent strip then provided a decorative effect, while one 100-watt, two-bulb Power Groove supplied better floodlighting for less electricity than the proposed dual 300-watt conventional bulbs. Resulting economies helped the contractor sell the job.

A pioneer in advancing the use of Quartzline lamps, Mr. Leetzow urged and aided a contractor in planning the installation of 26 1,500-watt units atop 40-foot wood poles to shed 27 footcandles at homeplate of the Billy Bowlegs Memorial Stadium (Little League) in Fort Myers.

With mercury vapor lighting estimated at $17,000, Mr. Leetzow's guidance helped the contractor get the job. The savings were so substantial that Little League officials used money saved to complete several other projects.

Mr. Braverman concludes: "A satellite house is doomed to fall in the face of today's tremendous lighting challenge when the architect, homemaker, builder, and designer all seem to sense the need for well-designed lighting installations to provide the proper atmosphere in the home or commercial establishment.

"If the supplier is to render real service to his contractor customers, he simply cannot stock a cross section of bread and butter items and be of any consequential help to his trade.

"If the area warrants it, it becomes the supplier's prime responsibility to have a full-scale supplying operation, or none at all.

"And if the area doesn't warrant a comprehensive outlet, the supplier won't make any money, nor will his contractors who will be the first to feel their supplier's inadequacy."

NAED course

(Continued from page 23)

obtain as great a consensus as possible.

Following this, personal contacts were conducted inside and outside the electrical industry—for advice and counsel on the development of course materials and for ideas on how the course should be set up for maximum benefits to members.

Various national credit exchange and rating agencies—again within and outside of the electrical industry—also were consulted. According to one NAED official, "It should be said . . . that the cooperation received from all these sources was readily forthcoming and the information of great use."

This newest management training program is a continuation of the executive training program that was sponsored by the National Association of Electrical Distributors in 1954 and 1956 at the Harvard Graduate School of Business Administration.

All of the management training courses under the new educational program—the credit and collections course as well as those planned for the future, such as sales management, purchasing, warehouse management, office management, executive and personnel management—will be conducted at a location within rea-

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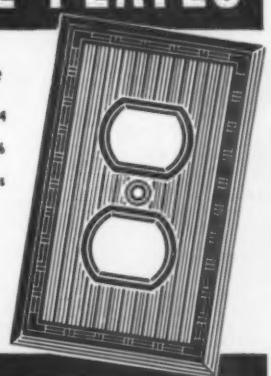

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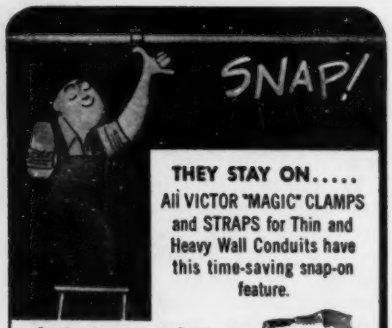

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Economic comment

(Continued from page 4)

Some forecasters have indicated that the major securities are close to the lowest prices they will have for some time to come. The speed by which normalcy returns to the automotive group (end of the current strike pattern and the first statistics of the impact of the new models on the market) will have a strong influence on market trends on into 1962.

This will be an effective guide to personal investment planning in the months ahead.

Washington report

(Continued from page 6)

than in the same period in 1960.

In private construction, spending in September in all major categories, except industrial, was running ahead of 1960. Industrial construction was off 12 per cent.

The outlook, according to the Census Bureau, is for continuing advances. Home construction can be expected to turn up, despite the recent lag. Spending on public construction will continue strong.

Discrimination complaint is upheld by committee

THE FIRST RACIAL discrimination complaint of its kind against a construction contractor working on a federal contract has been upheld.

The complaint was against a Florida contractor working on an Army barracks. It was brought by a union, and was upheld by the President's Committee on Equal Employment Opportunity.

The contractor had a choice: hire Negroes or give up the contract. He hired Negroes.

Electrical contractors who obtain government contracts will find that they, too, must meet requirements of the committee in order to keep their contracts.

Here is a brief analysis of committee requirements:

Want ads for employees must state that applicants will be considered without regard to race, creed, color, or national origins.

You must notify all labor unions with which you deal of your commitment not to discriminate. You must post copies of the notice where employees can read them.

You must agree to supply information and open your books to the President's Committee so it can determine whether you are complying.

If you subcontract you must put non-discrimination clauses in the subcontract. If the committee directs, you must make sure that the subcontractor complies. The same holds true for purchase orders and suppliers.

If you deal with a union, you must inform the committee whether union policies are non-discriminatory.

If you don't comply, the committee can cancel the contract and blacklist you from further government contracts.

Unfortunately, the committee gives contractors no definition of discrimination or any standards to follow.

Statement of Ownership

Statement required by the act of August 24, 1912, as amended by the acts of March 3, 1933, July 2, 1946 and June 11, 1960 (74 Stat. 208) showing the ownership, management, and circulation of ELECTRICAL SOUTH published monthly at Dalton, Georgia for October, 1961.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, W. R. C. Smith Publishing Co., Atlanta, Ga.; Editor, Carl W. Evans, Atlanta, Ga.; Business Manager, Frank P. Bell, Atlanta, Georgia.

2. The owners are: W. R. C. Smith Publishing Co., Atlanta, Ga.; Estate of W. R. C. Smith, Atlanta, Ga., W. J. Rooke, Atlanta, Ga.; O. A. Sharpless, Atlanta, Ga.; T. W. McAllister, Windermere, Fla.; E. W. O'Brien, Atlanta, Ga.; J. C. Cook, Atlanta, Ga.; R. P. Smith, Atlanta, Ga.; Mrs. E. L. Philpot, Atlanta, Ga.; A. F. Roberts, Atlanta, Ga.; S. J. Jones, Atlanta, Ga.; W. C. Herbert, Atlanta, Ga.

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4. Paragraphs 2 and 3 include, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise to paid subscribers during the 12 months preceding the date shown above was (This information is required by the act of June 11, 1960, to be included in all statements regardless of frequency of issue.): 12,433.

FRANK P. BELL
Business Manager

Sworn to and subscribed before me this 8th day of September, 1961.

SEBA J. JONES, Notary Public
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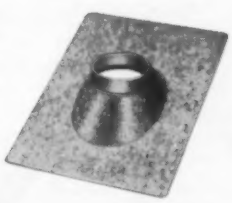

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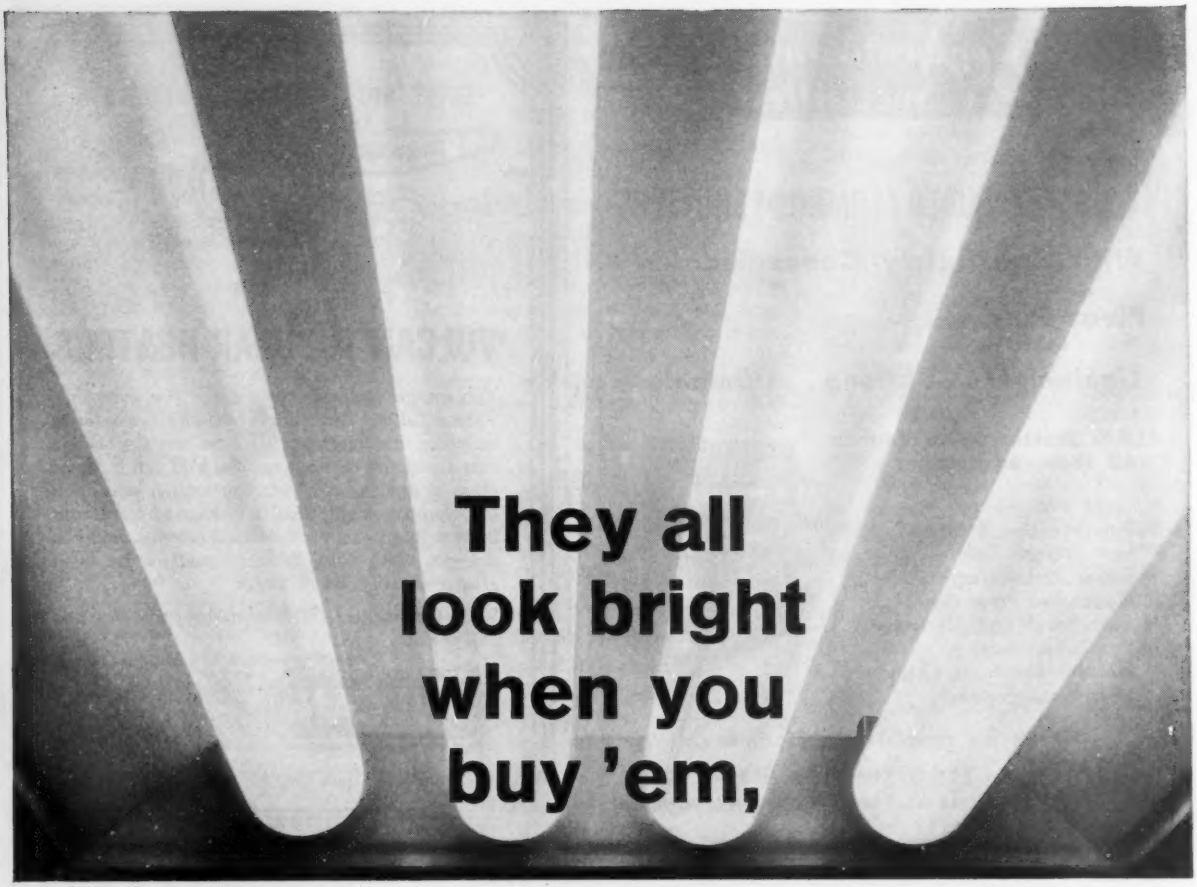

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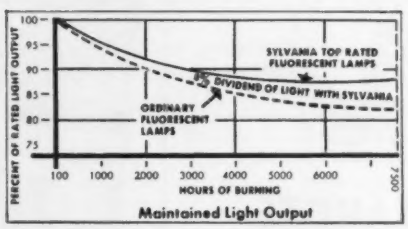

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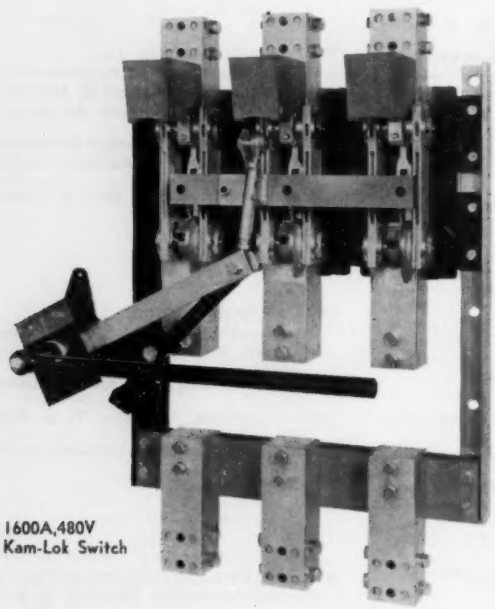

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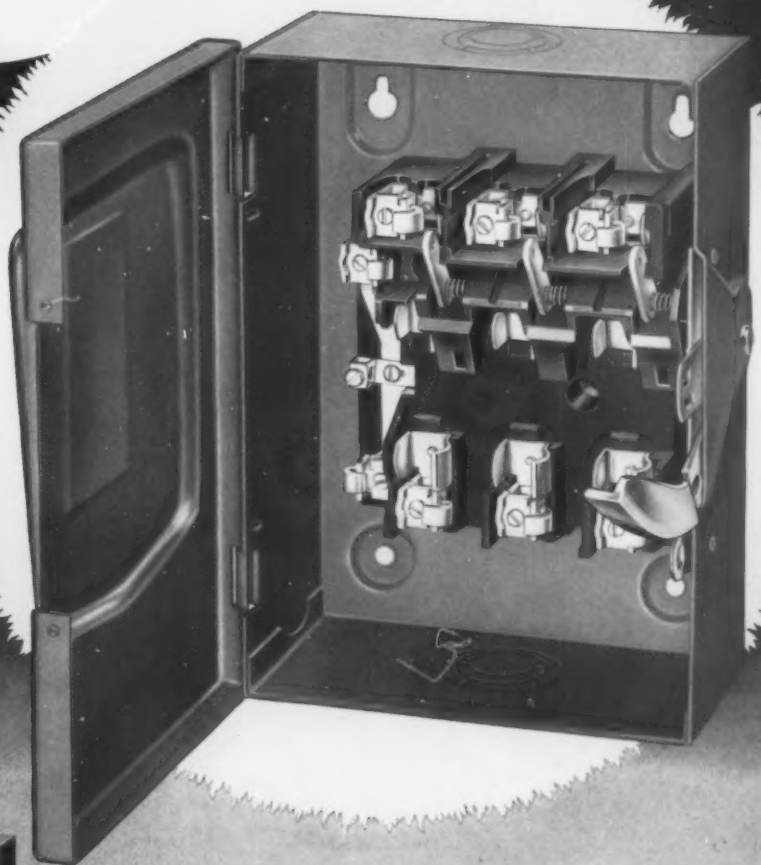

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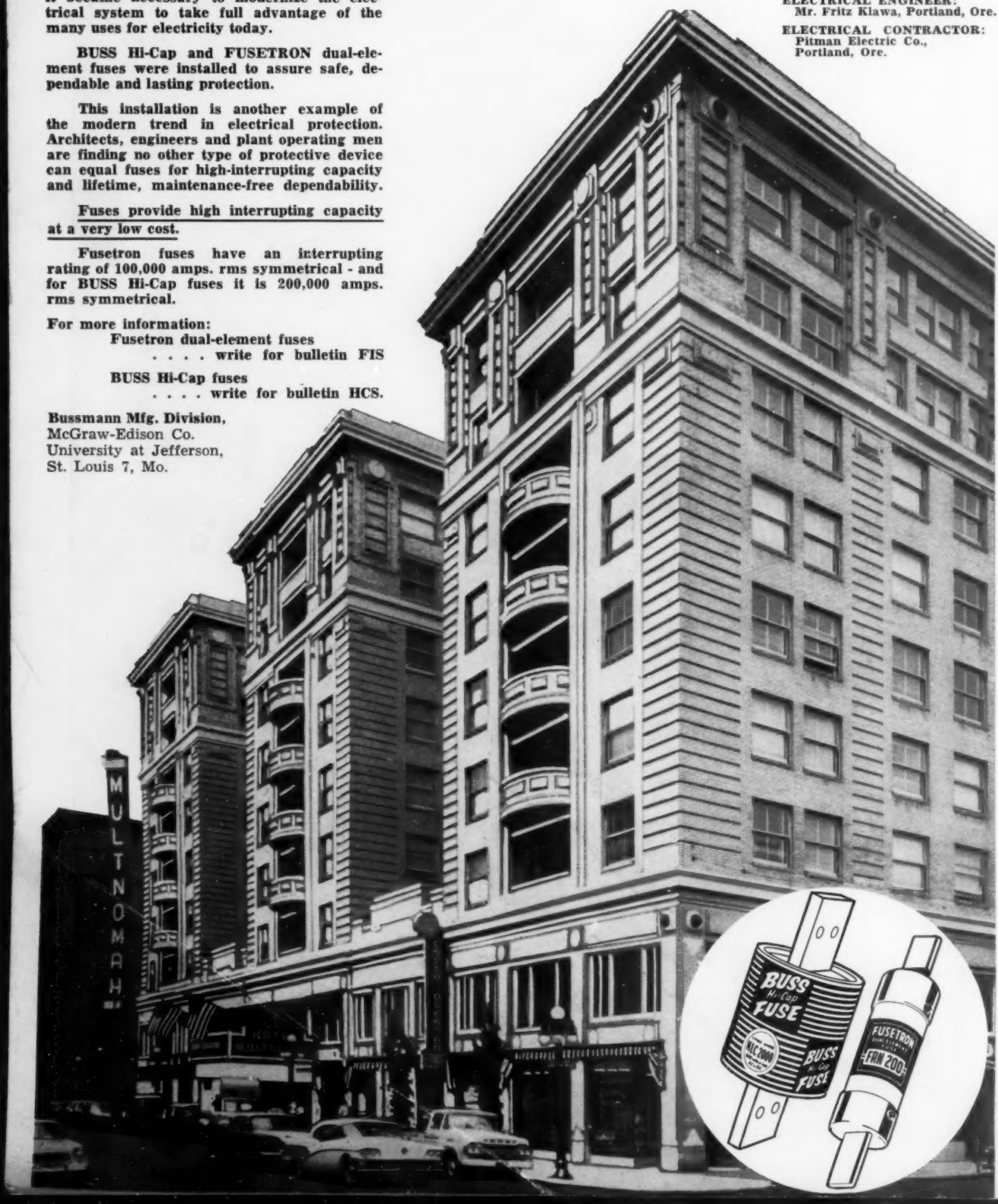
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